

CASE NO. 14-1477

IN THE UNITED STATES COURT OF APPEALS
FOR THE FEDERAL CIRCUIT

VIRGINIA INNOVATION SCIENCES, INC.

Plaintiff-Appellant,

V.

SAMSUNG ELECTRONICS CO., LTD., SAMSUNG ELECTRONICS
AMERICA, INC., AND SAMSUNG TELECOMMUNICATIONS AMERICA,
LLC

Defendant-Appellee

Appeal from the United States District Court for the Eastern District of Virginia
in Case Nos. 2:12-cv-548, 2:13-cv-332, Judge Mark S. Davis

**SECOND CORRECTED BRIEF OF PLAINTIFF-APPELLANT
VIRGINIA INNOVATION SCIENCES, INC.**

DATED: July 14, 2014

Timothy E. Grochocinski
INNOVALAW, P.C.
1900 Ravinia Place
Orland Park, Illinois 60462
P. 708-675-1975
E. 708-675-1786

Edward E. Casto, Jr.
NELSON BUMGARDNER CASTO, P.C.
3131 West 7th Street, Suite 300
Fort Worth, Texas 76107
P. 817-377-9111

*Attorneys for Plaintiff-Appellant
Virginia Innovation Sciences, Inc.*

VIRGINIA INNOVATION SCIENCES, INC.'S CERTIFICATE OF INTEREST

Counsel for Plaintiff-Appellant Virginia Innovation Sciences, Inc. certifies
the following:

1. The full name of every party represented by me is Virginia Innovation Sciences, Inc.
 2. The name of the real party in interest represented by me is Virginia Innovation Sciences, Inc.
 3. Virginia Innovation Sciences, Inc. does not have any parent corporations and no publicly held company owns 10 percent or more of the stock in Virginia Innovation Sciences, Inc.
 4. The names of all law firms and the partners or associates that appeared for Virginia Innovation Sciences, Inc. in the trial court, or are expected to appear in this Court, are:

Innovalaw, P.C.
Timothy E. Grochocinski
Joseph P. Oldaker
Aaron W. Purser (withdrawn)

Nelson Bumgardner Casto, P.C.
Edward R. Nelson, III
Edward E. Casto, Jr.
Thomas C. Cecil
Jonathan H. Rastegar
Anthony Vecchione
Christie B. Lindsey

Crenshaw, Ware & Martin, PLC
W. Ryan Snow
David C. Hartnett

Ward & Smith Law Firm
T. John Ward, Jr.
Claire Abernathy Henry

DATED: July 14, 2014

By: /s/Timothy E. Grochocinski
Timothy E. Grochocinski

INNOVALAW, P.C.
1900 Ravinia Place
Orland Park, Illinois 60462
P. 708-675-1975
F. 708-675-1786

Edward E. Casto, Jr.

NELSON BUMGARDNER CASTO, PC
3131 West 7th Street, Suite 300
Fort Worth, Texas 76107
P. 817-377-9111
F. 817-377-3485

*Attorneys for Plaintiff-Appellant
Virginia Innovation Sciences, Inc.*

TABLE OF CONTENTS

Statement of Related Cases.....	1
Appellate Jurisdictional Statement	1
Statement of the Issues.....	2
Statement of the Case.....	3
Statement of the Facts	6
I. The '492, '711, and '268 Patents.....	6
II. HDMI and MHL in General	11
A. HDMI	12
B. MHL (Specification Excerpts Related to MHL, Redacted as Confidential Pursuant to Protective Order)	14
III. The Accused MHL-Enabled Products	15
IV. U.S. Patent No. 7,580,005 to Palin.....	16
Summary of the Argument.....	18
Argument.....	21
I. Standard of Review	21
II. The District Court Erred in Its Construction of “Display Format.”	22
A. There Is No Support for the District Court’s Negative Construction of “Display Format.”	22
B. The District Court’s Construction of “Display Format” Excludes the Preferred Embodiment.....	27
III. The District Court Erred in Granting Summary Judgment of No Infringement Because MHL Is a “Display Format,” when Properly Construed.....	29
A. The Proper Construction of “Display Format” Is a Decompressed Encoded Video Signal that Is Different from the Mobile Terminal Signal Originally Received.....	29
B. MHL Is a “Display Format.”	30

IV. The District Court Erred in Granting Summary Judgment of Invalidity Because Palin Does Not Disclose the “Conversion” Limitation of Claim 21 of the ’268 Patent	32
A. Palin Does Not Disclose the Required “Conversion” Limitation of Claim 21.....	32
B. The District Court’s Invalidity Order Is Inconsistent — Palin Does Not Disclose the Required “Display Format” Limitation of Claim 21.....	35
Conclusion and Relief Sought	37
Addendum	40

TABLE OF AUTHORITIES

Cases

<u><i>Accent Packaging, Inc. v. Leggett & Platt Inc.,</i></u>	
707 F.3d 1318 (Fed. Cir. 2013)	19, 29
<u><i>Kara Tech. Inc. v. Stamps.com Inc.</i>, 582 F.3d 1341 (Fed. Cir. 2009)</u>	22
<u><i>Liebel-Flarsheim Co. v. Medrad, Inc.,</i></u>	
358 F.3d 898 (Fed. Cir. 2004), <i>aff'd</i> , 481 F.3d 1371 (Fed. Cir. 2007)	25
<u><i>Lighting Ballast Control LLC v. Philips Elecs. N. Am. Corp.,</i></u>	
744 F.3d 1272 (Fed. Cir. 2014) (en banc)	21
<u><i>Linear Tech. Corp. v. Int'l Trade Commission,</i></u>	
566 F.3d 1049 (Fed. Cir. 2009)	24
<u><i>Microsoft Corp. v. i4i Ltd. P'ship</i>, 131 S.Ct. 2238 (2011)</u>	36
<u><i>Omega Eng'g, Inc. v. Raytek Corp.</i>, 334 F.3d 1314 (Fed. Cir. 2003)</u>	24, 26, 27
<u><i>Phillips v. AWH Corp.</i>, 415 F.3d 1303 (Fed. Cir. 2005) (en banc)</u>	21, 25, 36
<u><i>Rambus Inc. v. Rea</i>, 731 F.3d 1248 (Fed. Cir. 2013)</u>	29
<u><i>Rhine v. Casio, Inc.</i>, 183 F.3d 1342 (Fed. Cir. 1999)</u>	31
<u><i>Salazar v. Procter & Gamble Co.</i>, 414 F.3d 1342 (Fed. Cir. 2005)</u>	22
<u><i>SunTiger, Inc. v. Scientific Research Funding Group,</i></u>	
189 F.3d 1327 (Fed. Cir. 1999)	22

Thorner v. Sony Computer Entm't Am. LLC,

669 F.3d 1362 (Fed. Cir. 2012) 21, 25

Statutes

<u>28 U.S.C. § 1259(a)(1)</u>	2
<u>28 U.S.C. § 1338(a)</u>	1
<u>28 U.S.C. § 2107(a)</u>	2
<u>28 U.S.C. §§ 1331</u>	1
<u>35 U.S.C. § 316(e)</u>	36
<u>37 CFR § 42.100(b)</u>	36

Rules

<u>Fed. R. App. P. 4(a)(1)(A)</u>	2
---	---

STATEMENT OF RELATED CASES

No other appeals in or from the same civil actions or proceedings were previously before this or any other appellate court.

The following district court cases are before this Court pursuant to this Court's consolidation of these matters:

- *Virginia Innovation Sciences, Inc. v. Samsung Electronics Co., Ltd., Samsung Electronics America, Inc., and Samsung Telecommunications America, LLC*, Case No. 2:12-CV-00548-MSD-TEM, United States District Court for the Eastern District of Virginia (“VIS I”);
 - *Virginia Innovation Sciences, Inc. v. Samsung Electronics Co., Ltd., Samsung Electronics America, Inc., and Samsung Telecommunications America, LLC*, Case No. 2:13-CV-00332-MSD-TEM, United States District Court for the Eastern District of Virginia (“VIS II”).

APPELLATE JURISDICTIONAL STATEMENT

The United States District Court for the Eastern District of Virginia had subject matter jurisdiction pursuant to 28 U.S.C. §§ 1331 and 1338(a). On January 8, 2014, the district court granted-in-part and denied-in-part Defendants' motion for summary judgment of invalidity and of no willful infringement. Opinion and Order, 2:12-cv-548 (Dkt. 413) ("VIS I Summary Judgment Ruling") [A00096]. On April 11, 2014, the district court granted-in-part and denied-in-part Defendants'

motion for summary judgment of no infringement. Opinion and Order, 2:13-cv-332 (Dkt. 250) (“VIS II Summary Judgment Ruling”) [A00127-29]. On May 2, 2014, the district court denied Virginia Innovation Sciences, Inc.’s motion for reconsideration of the district court’s January 8, 2014 ruling. Opinion and Order, 2:12-cv-548 (Dkt. 569) (“VIS I Denial of Validity Reconsideration”) [A00187-88]; Opinion and Order, 2:13-cv-332 (Dkt. 269) (“VIS II Denial of Validity Reconsideration”) [A00232-33]. On May 5, 2014, the district court entered final judgment in these matters pursuant to the parties’ stipulations. Stipulated Final Judgment, 2:12-cv-548 (Dkt. 583) (“VIS I Stipulated Final Judgment”) [A00237-239]; Stipulated Final Judgment, 2:13-cv-332 (Dkt. 284) (“VIS II Stipulated Final Judgment”) [A00244-46].

On May 12, 2014, notices of appeal regarding these rulings were timely filed. 28 U.S.C. § 2107(a); Fed. R. App. P. 4(a)(1)(A); Notice of Appeal, 2:12-cv-548 (Dkt. 584) [A12115-18]; Notice of Appeal, 2:13-cv-332 (Dkt. 285) [A12111-14]. The orders appealed from are final. This Court has appellate jurisdiction under 28 U.S.C. § 1259(a)(1).

STATEMENT OF THE ISSUES

1. Did the district court err in its construction of the term "display format?"

2. Did the district court err in finding that MHL is not a “display format,” thereby granting summary judgment of no infringement with respect to the Asserted Claims¹ of U.S. Patent No. 7,899,492, U.S. Patent No. 8,050,711, and U.S. Patent No. 8,145,268?

3. Did the district court err in granting summary judgment of invalidity with respect to claims 21, 22, 25, 28, and 29 of U.S. Patent No. 8,145,268?

STATEMENT OF THE CASE

This appeal relates to two actions for patent infringement brought by Virginia Innovation Sciences, Inc. (“VIS”) against Defendants-Appellees Samsung Electronics Co., Ltd., Samsung Electronics America, Inc., and Samsung Telecommunications America, LLC (collectively, “Samsung”) in Civil Action Nos. 2:12-CV-548 (“VIS I”) and 2:13-CV-332 (“VIS II”) in the United States District Court for the Eastern District of Virginia. VIS I First Amended Complaint, 2:12-cv-548 (July 24, 2013) (Dkt. 121) [A01606]; VIS II First Amended Complaint; 2:13-cv-332 (October 18, 2013) (Dkt. 47) [A03648]. The

¹ At the time of the district court’s April 11, 2014 ruling, VIS had limited the asserted claims from the ’492, ’711, and ’268 patents to claims 24 and 33 of the ’492 patent, claim 16 of the ’711 patent, and claim 27 of the ’268 patent. Joint Stipulation, 2:12-cv-548 (Dkt. 567) [A12102]; Joint Stipulation, 2:13-cv-332 (Dkt. 267) [A12093]. These claims are hereinafter referred to as the “Asserted Claims.” Additional claims, not implicated in this appeal, were asserted by VIS. At the time of the district court’s April 11, 2014 ruling, only claim 27 of the ’268 patent was asserted. This was due, at least in part, to the district court’s summary judgment finding regarding the validity of claims 21, 22, 25, 28, and 29 of the ’268 patent.

five patents-in-suit are U.S. Patent Nos. 7,899,492 (“the ’492 patent”); 8,050,711 (“the ’711 patent”); 8,145,268 (“the ’268 patent”); 8,224,381 (“the ’381 patent”); and 8,135,398 (“the ’398 patent”). The ’492 patent [A00249-62]; the ’711 patent [A00264-77]; the ’268 patent [A00279-92]; the ’381 patent [A00294-308]; the ’398 patent [A00350-89].

On January 8, 2014, the district court granted summary judgment of invalidity with respect to claims 21, 22, 25, 28, and 29 of the ’268 patent, finding that U.S. Patent No. 7,580,005 to Palin (“Palin”) anticipated these claims. VIS I Summary Judgment Ruling at [A00096]. Claims 22, 25, 28, and 29 of the ’268 patent depend from Claim 21. ’268 patent at Claims 22, 25, 28, and 29 [A00292].

On September 5, 2013, Samsung filed requests for *inter partes* review (“IPR”) with respect to all five of the patents-in-suit, including the ’268 patent. Samsung argued that Palin anticipated all asserted independent claims in the ’492, ’711, and ’268 patents, including claim 21 of the ’268 patent. Decision Denying Institution of *Inter Partes* Review, 2:12-cv-548 (Dkt. 417-2) (the “’492 IPR Decision”) [A05508]; Decision Denying Institution of *Inter Partes* Review, 2:12-cv-548 (Dkt. 417-3) (the “’711 IPR Decision”) [A05528]; Institution of *Inter Partes* Review, 2:12-cv-548 (Dkt. 417-4) (the “’268 IPR Decision”) [A05551]. On March 6, 2014, the Patent and Trademark Appeals Board (“PTAB”) denied institution of IPR review with respect to the ’492 and ’711 patents and granted IPR

review with respect to the '268 patent. '492 IPR Decision at [A05519]; '711 IPR Decision at [A05541-42]; '268 IPR Decision at [A05561-62]. However, with respect to claim 21 of the '268 patent, the PTAB did not institute the IPR on Samsung's requested basis that Palin anticipated that claim. '268 IPR Decision at [A05562]. In these decisions, the PTAB interpreted the disclosure in Palin. '492 IPR Decision at [A05512-19]; '711 IPR Decision at [A05431-41]; '268 IPR Decision at [A05555-60]. Based on the PTAB's interpretation of the disclosure in Palin, VIS filed a motion for reconsideration of the Court's January 8, 2014 invalidity ruling, arguing that the PTAB's findings demonstrated that there was a genuine issue of material fact as to whether Palin anticipated claims 21, 22, 25, 28, and 29 of the '268 patent. Motion for Reconsideration, 2:12-cv-548 (Dkt. 416) [A05489-90]. On May 2, 2014, the district court denied VIS's motion for reconsideration. VIS I Denial of Validity Reconsideration at [A00187-88]; VIS II Denial of Validity Reconsideration at [A00232-33].

On April 11, 2014, the district court granted summary judgment of non-infringement in favor of Samsung, finding that the accused MHL-enabled products in VIS II do not by themselves directly infringe the asserted claims of the '492, '711, and '268 patents. VIS II Summary Judgment Ruling at [A00127-29]. This was based on the district court's construction of the term "display format" and its subsequent finding that MHL is not a "display format." *Id.* at [A00120-126].

Based on the Court's April 11, 2014 ruling, the parties' submitted a Stipulated Final Judgment to the district court. VIS I Stipulated Final Judgment at [A00234]; VIS II Stipulated Final Judgment at [A00241]. On May 5, 2014, the district court entered final judgment in VIS I and VIS II. VIS I Stipulated Final Judgment at [A00237-239]; VIS II Stipulated Final Judgment at [A00244-46].

VIS respectfully requests that this Court: (1) reverse the district court's construction of the term "display format;" (2) reverse the district court's finding of summary judgment of no infringement; (3) reverse the district court's finding of summary judgment of invalidity with respect to claims 21, 22, 25, 28, and 29 of the '268 patent; and (4) remand these cases to the district court for further proceedings.

STATEMENT OF THE FACTS

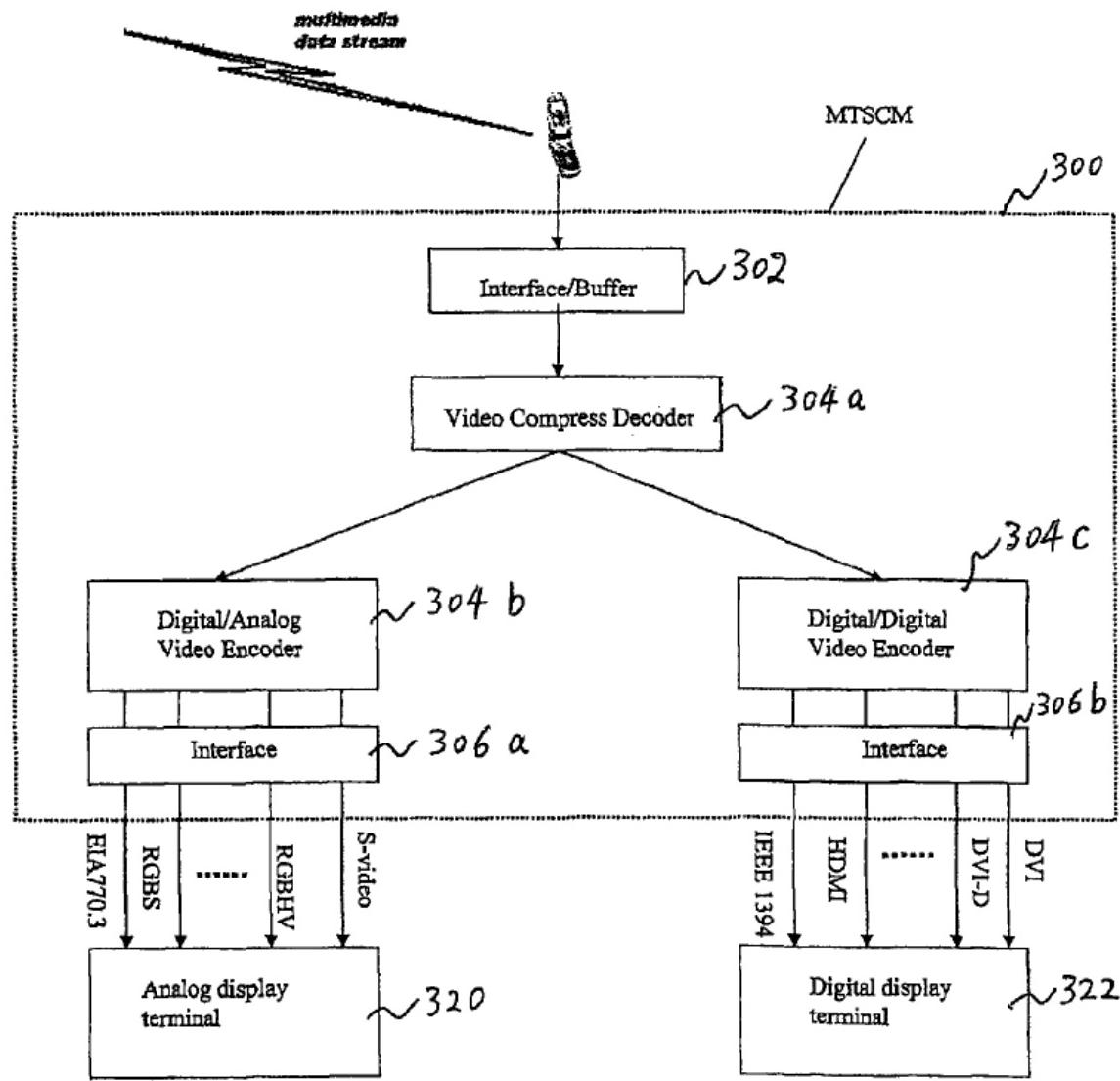
I. THE '492, '711, AND '268 PATENTS

The Asserted Claims in the '492, '711, and '268 patents generally relate to apparatuses for converting / processing video signals to accommodate reproduction of such video signals by an alternative display terminal, such as a television. *See* '492 patent at Claim 23 [A00262]; '711 patent at Claim 15 [A00277]; '268 patent at Claim 21 [A00292]. The three independent claims at issue in this appeal are claim 23 of the '492 patent, claim 15 of the '711 patent, and claim 21 of the '268 patent. *Id.* Each of these independent claims consists of three general parts:

- (1) An interface module that receives a video signal appropriate for displaying video content on a mobile terminal;

- (2) A conversion module / processing unit for converting / processing the video signal to produce a converted video signal for use by the alternative display, the conversion / processing including converting the signal format appropriate for the mobile terminal to a display format for the alternative display terminal that is different from the signal format; and
- (3) An output interface for providing the converted video signal to the alternative display terminal.

Id. The central issues on appeal relate to part (2) above, and more specifically: (i) the construction of the limitation “display format;” (ii) whether or not the accused MHL enabled products in VIS II infringe this limitation when properly construed; and (iii) whether Palin discloses the conversion limitation in claim 21 of the ’268 patent.



'268 patent at Fig. 3 [A00283]. As shown above in Figure 3 of the '268 patent,² in the preferred embodiment the mobile terminal receives a multimedia data stream (e.g., video signal), appropriate for displaying video content on the mobile terminal, via the claimed interface module 302. *Id.* Examples of appropriate video

² The '492, '711, and '268 patents share a common specification. The '268 patent is a continuation of the '711 patent, which is a continuation of the '492 patent. '268 patent [A00279].

signals for the mobile terminal include those provided by the MPEG standards (e.g., MPEG-1, MPEG-2, MPEG-4). '268 patent 6:9-20 [A00290].

The video signal is then received by the video compress decoder 304a. *Id.* “The Video Compress Decoder 304a is configured to include the appropriate compression/decompression (CODEC) module to accommodate decompression of the received multimedia signal.” *Id.* at 6:14-17 [A00290]. Following this,

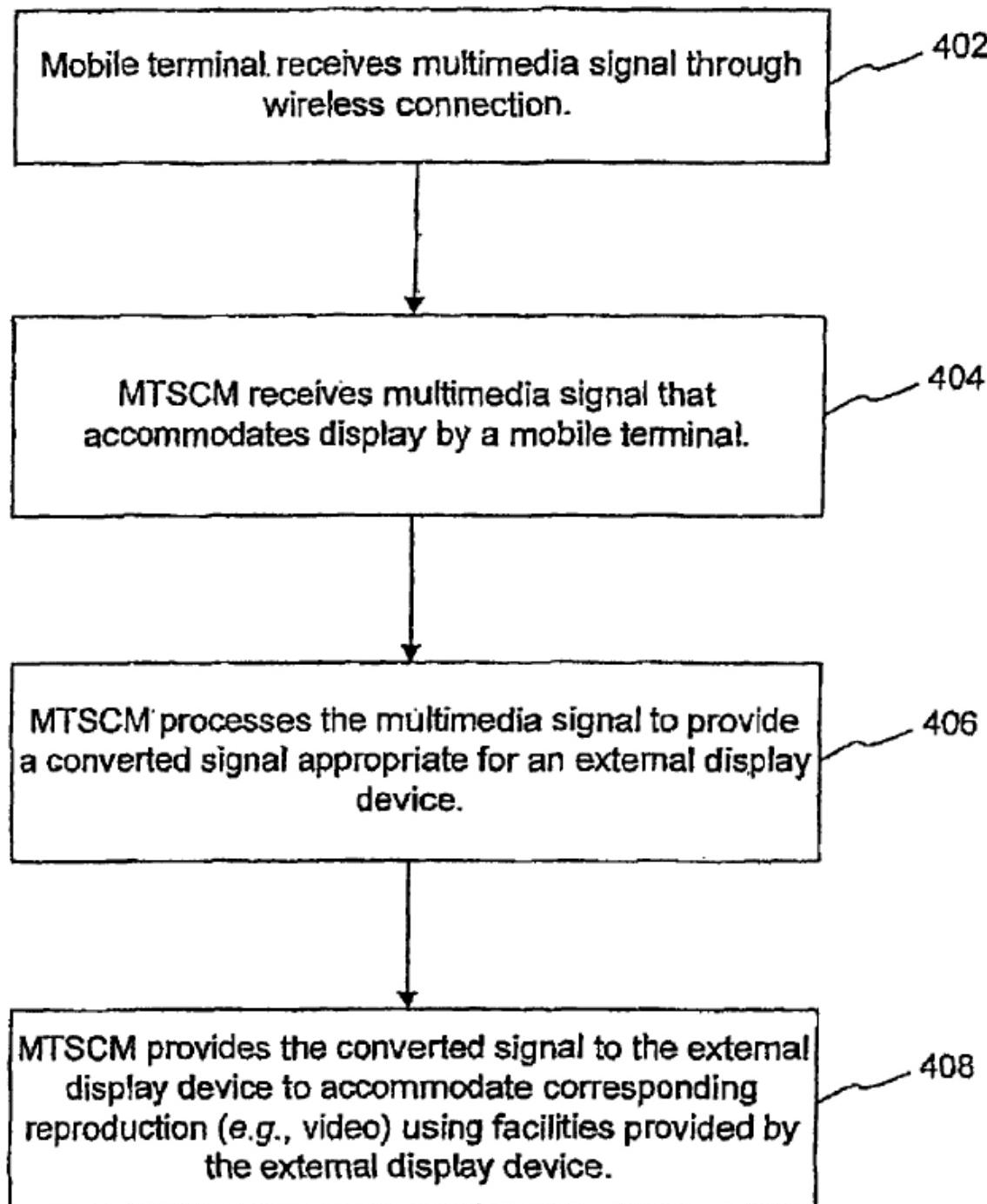
[t]he Video Compress Decoder 304a outputs a decompressed digital multimedia signal that is passed to the Digital/Analog Video Encoder (DAVE) 304b and/or the Digital/Digital Video Encoder (DDVE) 304c. The DAVE 304b is configured to prepare signals for analog external display terminals 320, and the DDVE 304c is configured to prepare signals for digital external display terminals 322. The DAVE 304b and DDVE 304c respectively receive the decompressed multimedia signal and convert the signals to the format(s) and signal power level(s) required for the terminals to which they interface.

Id. at 6:29-39 [A00290]. Examples of converted video signals (i.e., signals that are now in a display format for the alternative display) are described in the '268 patent specification as follows:

Examples of formats used by analog display terminals 320 include S-video, RGBHV, RGBS, and EIA770.3 as illustrated. Similarly, the DDBE 304c provides output using standards such as DVI, DVI-D, HDMI, and IEEE1394.

Id. at 6:40-43 [A00290].

This process is also outlined in Figure 4, shown below.



Id. at Fig. 4 [A00284]. The mobile terminal receives the multimedia signal via a wireless connection at 402. *Id.* The mobile terminal signal conversion module

(MTSCM) then receives the multimedia signal, which is appropriate for displaying content on a mobile terminal (e.g., MPEG format). *Id.* The MTSCM then processes / converts the multimedia signal into a display format that is appropriate for an alternative display. *Id.* This process is shown in Figure 3. *Id.* at Fig. 3 [A00283]. Following this, the MTSCM provides the converted video signal that is in a display format (i.e., a decompressed encoded video signal format that is different from the mobile terminal signal format) to the alternative display. *Id.* at Fig. 4 [A00284].

II. HDMI AND MHL IN GENERAL

HDMI stands for High-Definition Multimedia Interface. VIS II Opening Expert Report of Arthur T. Brody [A04954]. MHL stands for Mobile High-Definition Link. *Id.* at [A04957]. HDMI and MHL are both signaling formats that rely on TMDS (Transition-Minimized Differential Signaling). *Id.* at [A04954, -4957]. Both HDMI and MHL are uncompressed signaling formats that transmit uncompressed data. *Id.* at [A04955, -4957]. Conversion from an HDMI signal to an MHL signal, or vice versa, does not change the data packets. *Id.* at [A04960]. Rather, the data packets are merely rearranged from a parallel format (HDMI) to a serial format (MHL). *Id.*

A. HDMI

As shown in the below diagram, to transmit data HDMI utilizes four differential pairs that make up the TMDS data and clock channels. *Id.* at [A04954]. These channels are used to carry video, audio, and auxiliary data. *Id.*

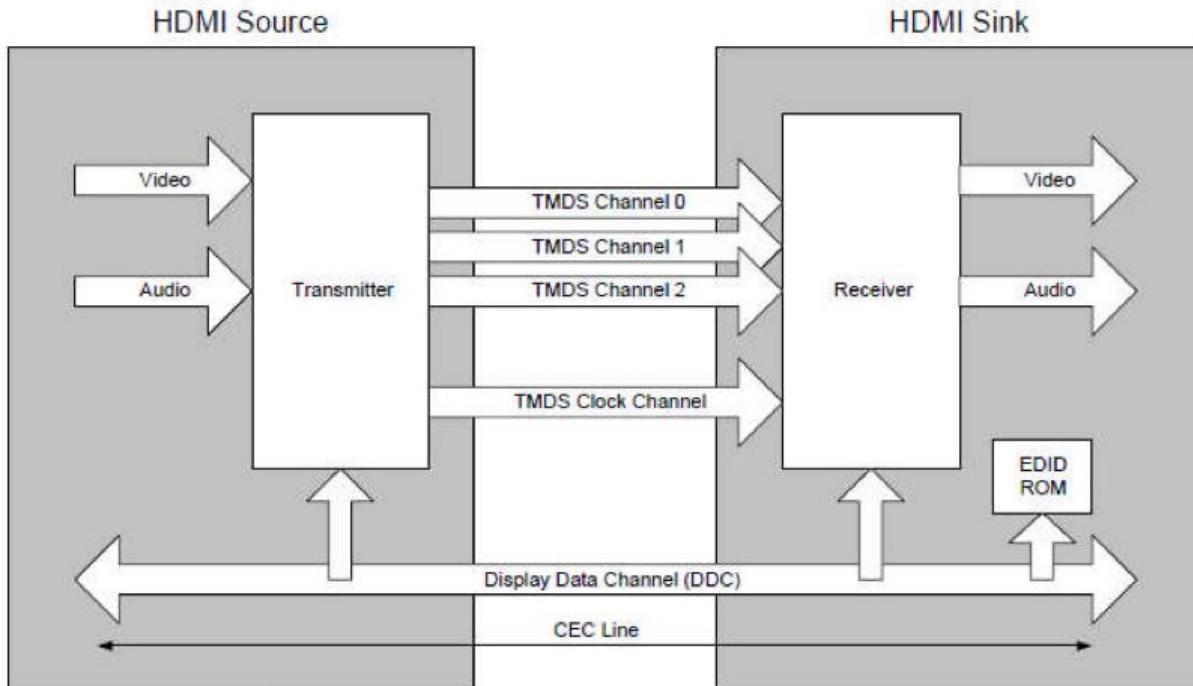
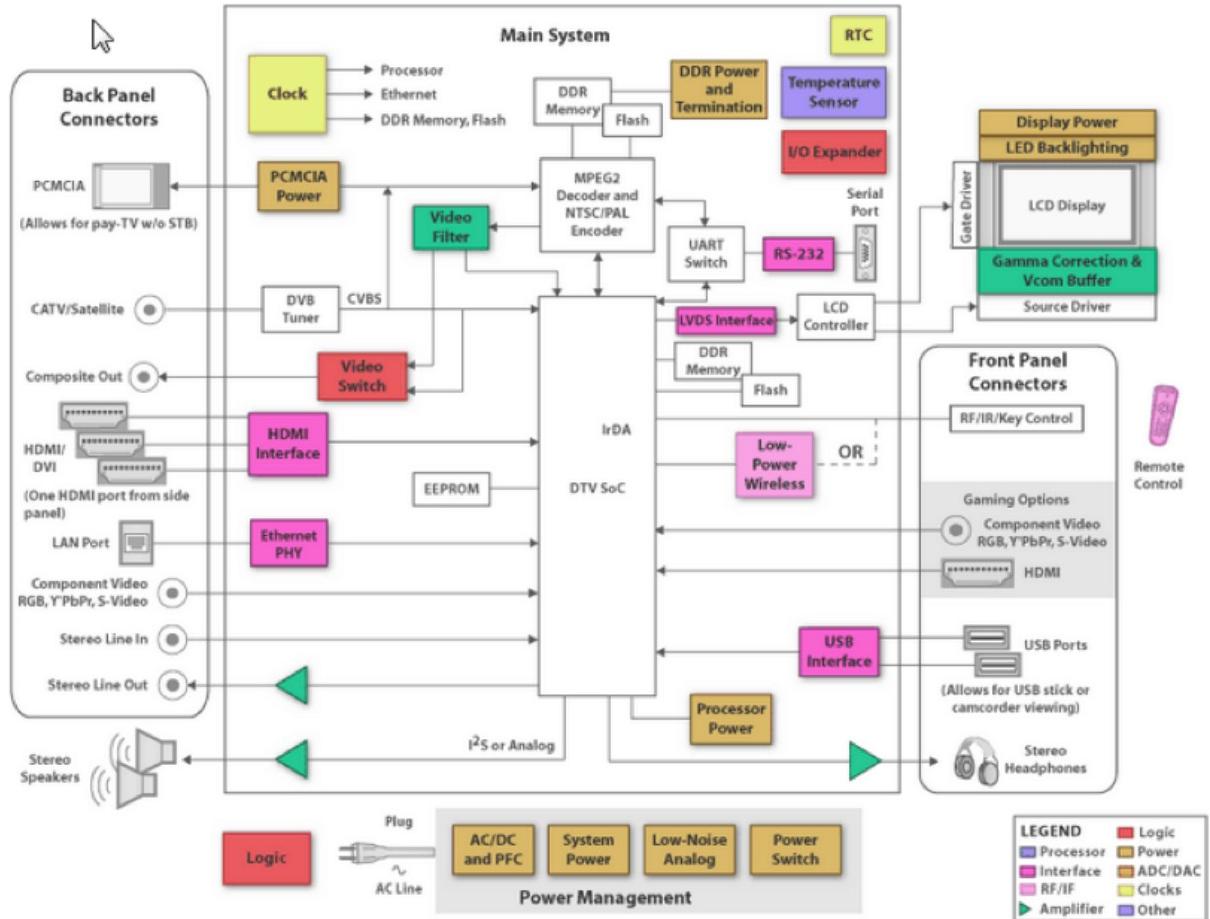


Figure 3-1 HDMI Block Diagram

Id. HDMI transmits uncompressed data over the three TMDS channels (i.e., Channels 0 – 2) in parallel. *Id.* at [A04954-55]. While HDMI is a display format for a digital television, the television must take additional actions once the HDMI signal is received prior to ultimately displaying the video content on the television. *Id.* at [A04955].



Shown above is a generic system block diagram for an LCD television. *Id.* at [A04955]. Once the HDMI signal is received, it is processed through an HDMI interface. *Id.* at [A04956]. Following this, the DTV SoC decodes the HDMI signal into raw pixel bits. *Id.* After this, the raw pixel bits are encoded into LVDS format (Low Voltage Differential Signaling) and then received by the LCD interface for display on the television. *Id.* In other words, when an HDMI signal is received by an alternative display, such as an LCD television, the HDMI signal is decoded / deconstructed and reassembled prior to display. Plaintiff's

Memorandum in Opposition to Samsung's Motion for Partial Summary Judgment,
2:13-cv-332 [A04923].

B. MHL

[Redacted as Confidential Pursuant to Protective Order]

MHL is also a display format for alternative displays, such as a television. *Id.* at [A04958]. As with HDMI, once an MHL signal is received by an alternative display, additional actions must be taken to prepare the MHL signal for display on the television. Plaintiff's Memorandum in Opposition to Samsung's Motion for Partial Summary Judgment, 2:13-cv-332 at [A04924]. The actions taken to prepare the signal are the same as those described for HDMI. *Id.* at [A04925-26]; VIS II Opening Expert Report of Arthur T. Brody [A04958]. The required actions can be accomplished using an MHL-to-HDMI bridge or via a dual-mode HDMI/MHL port processor. Plaintiff's Memorandum in Opposition to Samsung's Motion for Partial Summary Judgment, 2:13-cv-332 at [A04925-26]. In either instance, the serial MHL data channel is decoded / deconstructed and reassembled prior to display. *Id.*

III. THE ACCUSED MHL-ENABLED PRODUCTS

The relevant capabilities of the accused MHL-enabled products³ are not disputed. The MHL-enabled products at issue in this appeal are smartphones or tablets.⁴ VIS II Summary Judgment Ruling at [A00101-02]. All are capable of receiving a video signal appropriate for display on a mobile terminal (e.g., MPEG),

³ The list of MHL-enabled products for which the district court granted summary judgment of no infringement with respect to the '492, '711, and '268 patents includes the Galaxy Note III, Galaxy Victory, Galaxy Express, Galaxy S Relay, Galaxy S4, and Galaxy Note II. VIS II Summary Judgment Ruling at [A00102].

⁴ VIS has also accused of infringement certain intermediate devices (such as adapters and dongles) that are not at issue in this appeal.

converting that video signal to a decompressed format (MHL), and outputting the decompressed encoded video signal (MHL). VIS II Opening Expert Report of Arthur T. Brody [A04963-64; -4987-88]. The only capability of the accused MHL-enabled products that is relevant to the issues on appeal is that all of the accused MHL-enabled products are capable of outputting video content via MHL, not HDMI.

IV. U.S. PATENT NO. 7,580,005 TO PALIN

Palin is directed to splitting compressed data packets received in a cellular communication (e.g., GSM, EDGE, WCDMA). U.S. Patent No. 7,580,005 (“Palin”) 2:11-32 [A02193]. In Palin, the mobile phone receives a compressed signal that contains a Mobile Phone Part 54 and TV Receiver Part 56. VIS I Summary Judgment Ruling at [A00051-52].

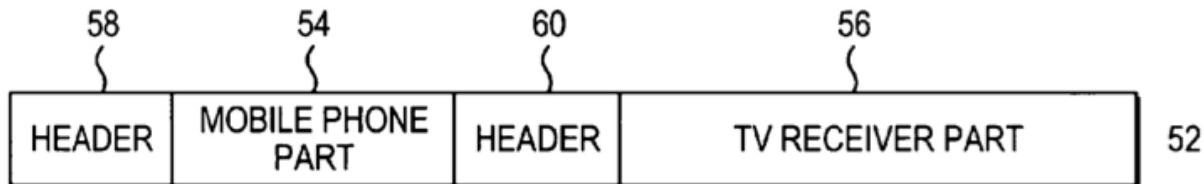


FIG. 4(b)

Palin at Fig. 4(b) [A02187]. Palin then utilizes splitting application 218 to split Mobile Phone Part 54 and TV Receiver Part 56. *Id.* at 6:28-31 [A02195]. The Mobile Phone Part 54 remains at the mobile phone and TV Receiver Part 56 is then transmitted via Bluetooth to a television. *Id.* at 5:39-61.

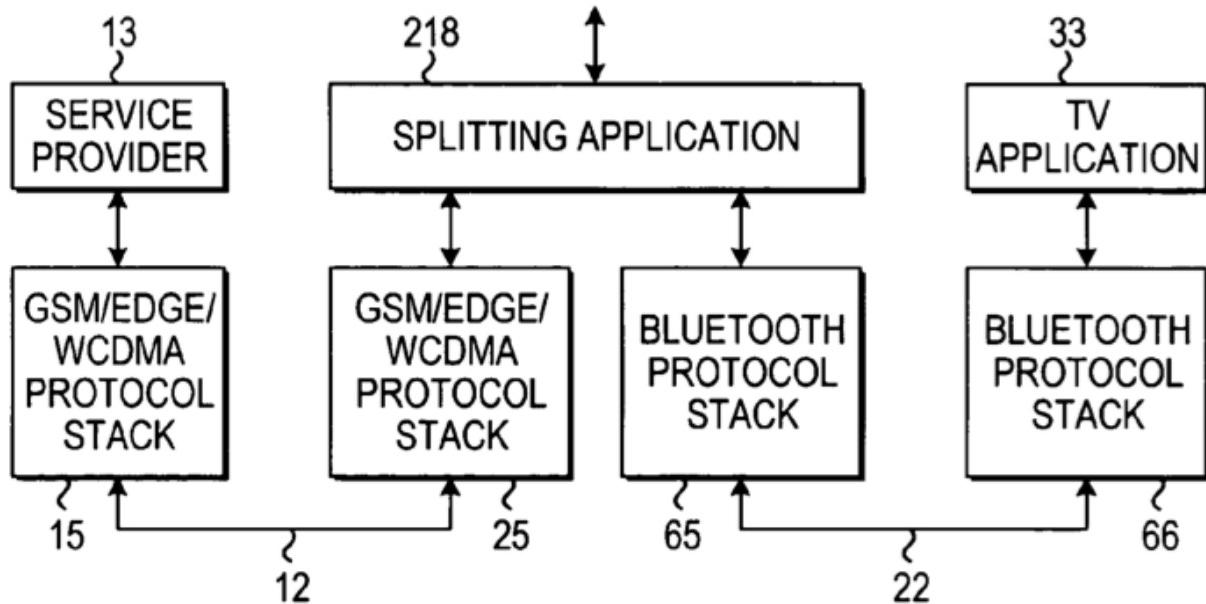
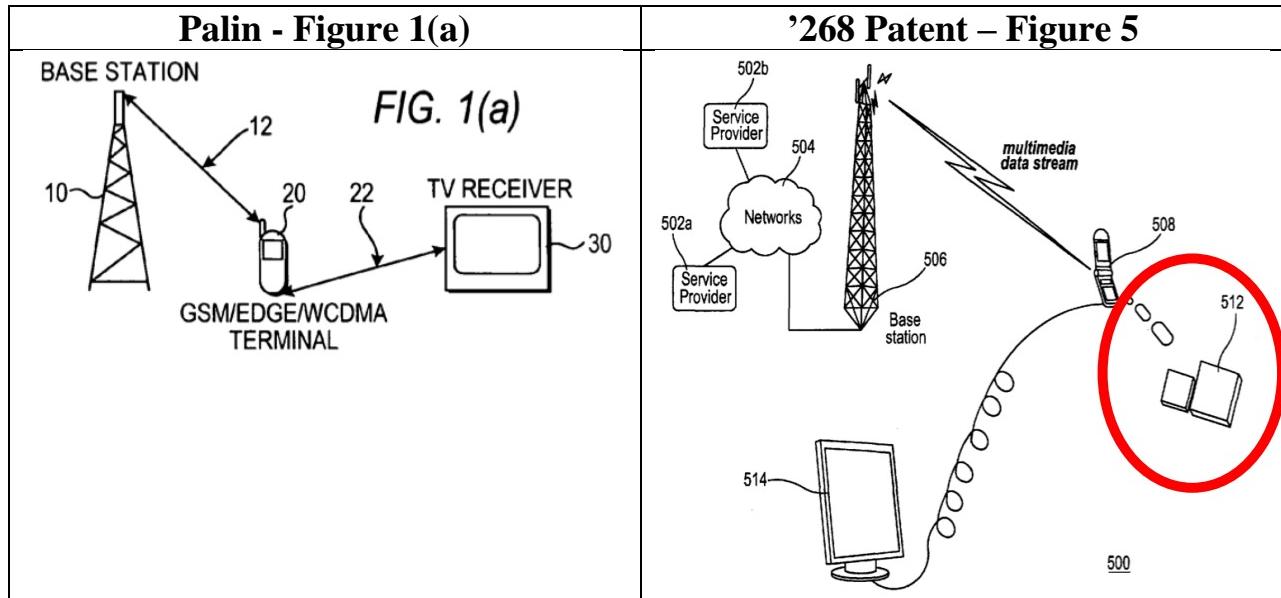


FIG. 1(b)

Id. at Fig. 1(b) [A02184]. Palin does not convert the Mobile Phone Part 54 or TV Receiver Part 56. Palin merely splits the incoming compressed signal and sends the respective parts (i.e., Mobile Phone Part 54 and TV Receiver Part 56) to either the mobile phone or television. '492 IPR Decision at [A05516-17]. When it transmits the TV Receiver Part 56 to a television, it is transmitted in compressed format via Bluetooth. VIS I Summary Judgment Ruling at [A00056]. Thus, the TV Receiver Part 56 is not transmitted to the television in an uncompressed format. *Id.* at [A00056-57].

This is highlighted by the below comparison of Palin to the '268 patent.



Notably absent from Palin is disclosure of a mobile terminal signal conversion module (MTSCM) 512. *Compare* Palin at Fig. 1(a) [A02184] and '268 Patent at Fig. 5 [A000285]. The TV Receiver Part 56 received by the mobile phone in Palin is the same TV Receiver Part 56 that is ultimately transmitted via Bluetooth to a television. '492 IPR Decision at [A05516-17].

SUMMARY OF THE ARGUMENT

The district court construed the term “display format” to exclude “a format which requires not just decoding, but deconstruction and reassembly after it is received by the alternative display.” VIS II Summary Judgment Ruling at [A00123]. There is absolutely no support in the intrinsic record for this negative construction, which effectively excludes the preferred embodiment. The preferred embodiment identifies HDMI as a “display format,” but an HDMI signal requires deconstruction and reassembly after it is received by an alternative display, such as

a television. '492 patent 6:37-40 [A00260]. As a result, allowing the district court's construction to stand would result in the asserted claims not covering the preferred embodiment, a result that is rarely, if ever, correct. *See, Accent Packaging, Inc. v. Leggett & Platt Inc.*, 707 F.3d 1318, 1326 (Fed. Cir. 2013).

Tellingly the district court does not identify any portion of the intrinsic record that supports its negative construction. VIS II Summary Judgment Ruling at [A00123]. The only portion of the intrinsic record even identified by the district court is the following statement which appeared three times in the '492 patent file history:

Applicant's claimed invention deals not only with mere decoding of a compressed video signal, but a conversion from a mobile terminal format to a different display format for the alternative display terminal.

Id. (citing File History for '492 patent [A05304]; [A05328-29]; [A05354]). This excerpt does not support the district court's construction. At best, applicants were merely stating that a display format is not just a decompressed video signal, but also must be a signal format that is different from the mobile terminal format originally received by the mobile terminal.

A "display format" is simply a decompressed encoded video signal that is in a format different from the mobile terminal format originally received. This construction is fully supported by the intrinsic record. Further, properly construed,

it is clear that MHL is a “display format.” As a result, the district court’s finding of no infringement should be reversed and remanded.

The district court also erred in finding that Palin anticipates claim 21 of the ’268 patent. Claim 21 of the ’268 patent requires the following limitation:

a processing unit for processing the video signal to produce a converted video signal for use by the alternative display terminal, wherein the processing includes converting a signal format appropriate for the mobile terminal to a display format for the alternative display terminal that is different from the signal format, the display format being a high definition digital format, ...

’268 patent at Claim 21 [A00292]. Palin does not disclose the required conversion. The PTAB agreed, finding Palin does not teach a conversion at all. ’492 IPR Decision at [A05516-17].

In addition, the district court’s finding that Palin anticipates claim 21 is contrary to the district court’s conclusion that a “display format” must be a decompressed format. VIS II Summary Judgment Ruling at [A00122]. Claim 21 requires that the video signal be converted to a “display format.” ’268 patent at Claim 21 [A00292]. The district court has held twice that a “display format” must be a decompressed format. VIS II Summary Judgment Ruling at [A00122]; VIS I Summary Judgment Ruling at [A00044]. The district court also concluded that Palin does not disclose outputting a decompressed video signal. VIS I Summary Judgment Ruling at [A00057]. Based on the district court’s own conclusions,

Palin cannot anticipate claim 21 of the '268 patent. As a result, the district court's finding that claim 21 is anticipated by Palin should be reversed.

ARGUMENT

I. STANDARD OF REVIEW

The Court reviews claim construction *de novo*. *Lighting Ballast Control LLC v. Philips Elecs. N. Am. Corp.*, 744 F.3d 1272, 1276-77 (Fed. Cir. 2014) (en banc). Claim terms are generally given their plain and ordinary meanings to one of skill in the art when read in the context of the specification and prosecution history. *See Phillips v. AWH Corp.*, 415 F.3d 1303, 1313 (Fed. Cir. 2005) (en banc). “There are only two exceptions to this general rule: 1) when a patentee sets out a definition and acts as his own lexicographer, or 2) when the patentee disavows the full scope of the claim term either in the specification or during prosecution.” *Thorner v. Sony Computer Entm't Am. LLC*, 669 F.3d 1362, 1365 (Fed. Cir. 2012).

Similarly, plenary review is given to “a district court’s grant of summary judgment, applying the same standard as the district court.” *Kara Tech. Inc. v. Stamps.com Inc.*, 582 F.3d 1341, 1349 (Fed. Cir. 2009); *see also Salazar v. Procter & Gamble Co.*, 414 F.3d 1342, 1344 (Fed. Cir. 2005) (“In the context of a grant of summary judgment of no infringement, this court reviews the entire infringement inquiry without deference.”); *SunTiger, Inc. v. Scientific Research Funding Group*, 189 F.3d 1327, 1333 (Fed. Cir. 1999) (“When a district court grants summary

judgment, we review without deference to the trial court whether there are disputed material facts, and we review independently whether the prevailing party is entitled to judgment as a matter of law.”).

II. THE DISTRICT COURT ERRED IN ITS CONSTRUCTION OF “DISPLAY FORMAT.”

A. There Is No Support for the District Court’s Negative Construction of “Display Format.”

The “display format” limitation was not addressed by the parties in connection with claim construction briefing. *See Plaintiff’s Opening Claim Construction Brief [A00771-801]; see also Defendants’ Opening Claim Construction Brief [A00802-832].* At that time, neither party contended that “display format” required construction. *Id.* Despite this, in granting summary judgment, the district court ruled that a “format which requires not just decoding, but deconstruction and reassembly after it is received by the alternate display” is not a “display format.” VIS II Summary Judgment Ruling at [A00123] (emphasis in original). Specifically, the district court stated:

The Court found that a “display format” must be decompressed because a video in compressed format must be deconstructed and reassembled into an uncompressed format in order to be displayed. Court’s Opinion on Summary Judgment 20, Case No. 2:12cv548, ECF No. 413. In reading the specifications of the patents-in-suit and asserted claims, the Court finds that the patents teach that conversion, which may include decompression, must take place at the mobile terminal prior to the multimedia content/video being sent to the

alternative display. In other words, any conversion to a display format, i.e. an uncompressed format, must occur prior to its transmission from the mobile terminal to the alternative display via an output interface. Thus, a format which requires not just decoding, but deconstruction and reassembly after it is received by the alternate display is not a “display format.”

Id. at [A00122-123] (emphasis in original). This construction is incorrect and finds no support in the intrinsic record.

First and foremost, the intrinsic evidence provides no support for the Court’s negative construction. The terms “deconstruction” and “reassemble” do not appear anywhere in the intrinsic record. This Court has long held that negative limitations may only be imported into the claims when the intrinsic record supports such a finding. *See e.g., Omega Eng’g, Inc. v. Raytek Corp.*, 334 F.3d 1314, 1333-34 (Fed. Cir. 2003).

In *Omega*, the district court construed the term “to outline” to include a negative limitation that precluded any projection of light into the interior or center of the energy zone. *Id.* at 1333. This Court reversed, finding that “neither the plain text of the claims, the specification, nor the file wrapper justifies the imposition of this negative limitation.” *Id.* *See also Linear Tech. Corp. v. Int’l Trade Commission*, 566 F.3d 1049, 1060 (Fed. Cir. 2009) (holding that “because there is no basis in the patent specification for adding the negative limitation – excluding monitoring voltage – we hold that the Commission erred in construing

this limitation”). Here, neither the plain text of the claims, the specification, nor the file wrapper justifies the finding that a display format cannot require deconstruction and reassembly by the alternative display terminal.

Moreover, the “words of a claim are generally given their ordinary and customary meaning as understood by a person of ordinary skill in the art when read in the context of the specification and prosecution history.” *Phillips*, 415 F.3d at 1313. The only two exceptions to this general rule are: (1) when a patentee sets out a definition and acts as his own lexicographer; or (2) when the patentee disavows the full scope of the claim term either in the specification or during prosecution. *Thorner*, 669 F.3d at 1365; *see also Liebel-Flarsheim Co. v. Medrad, Inc.*, 358 F.3d 898, 906 (Fed. Cir. 2004), *aff’d*, 481 F.3d 1371 (Fed. Cir. 2007) (“Even when the specification describes only a single embodiment, the claims of the patent will not be read restrictively unless the patentee has demonstrated a clear intention to limit the claim scope using words or expressions of manifest exclusion or restriction.”).

No party has argued, and the district court did not find, that the patentee acted as his own lexicographer and defined the term “display format.” As a result, this exception is not applicable.

With respect to the second exception, there is simply no justification for construing “display format” in a manner that precludes the possibility of

deconstruction and reassembly. The district court erroneously found that the patentees disclaimed “an interpretation of ‘display format’ as merely involving decompression.” *See, e.g.*, VIS II Summary Judgment Ruling at [A00123]. Specifically, the district court found that on three separate occasions during prosecution of the ’492 patent, the patentees disclaimed the full scope of “display format” by stating:

Applicant’s claimed invention deals not only with mere decoding of a compressed video signal, but a conversion from a mobile terminal format to a different display format for the alternative display terminal.

Id. (citing File History for ’492 patent [A05304]; [A05328-29]; [A05354]).

As a threshold matter, this is not a disavowal of claim scope. *See Omega*, 334 F.3d at 1324 (declining to apply doctrine of prosecution disclaimer where the alleged disavowal of claim scope is ambiguous). Rather, the above text merely reiterates what is already present in the claims (i.e., that the “display format” must be different than the mobile terminal format originally received).

Claim 23 of the ’492 patent and claim 15 of the ’711 patent require: “converting the video signal from a compression format appropriate for the mobile terminal to a display format for the alternative display terminal that is different from the compression format.” ’492 patent at Claim 23 [A00262]; ’711 patent at Claim 15 [A00277]. Similarly, claim 21 of the ’268 patent requires: “converting a signal format appropriate for the mobile terminal to a display format for the

alternative display terminal that is different from the signal format.” ’268 patent at Claim 21[A00292].

Setting this aside, even if it is determined that the alleged disavowal is not ambiguous, the ordinary meaning of the claims may only be narrowed congruently with the scope of the surrender. *See Omega*, 334 F.3d at 1324. At best, the alleged disavowal disclaims that the “display format” must be a decompressed format that is different than the mobile terminal format originally received. Nothing in the patentees’ statements supports the district court’s finding that a “display format” excludes “a format which required not just decoding, but deconstruction and reassembly after it is received by the alternative display.” VIS II Summary Judgment Ruling at [A00123]. In other words, even if the alleged disavowal rises to the level of disclaimer, the patentees merely disclaimed that the “display format” is not merely decompressed, but also must be different format than the mobile terminal format originally received. File History for ’492 patent [A05304]; [A05328-29]; [A05354]. This limitation is already expressed in the claims.

This interpretation of the patentees’ statement is also consistent with the preferred embodiment. As shown in Figure 3, the claimed conversion requires that the mobile terminal format be decompressed by 304a and then re-encoded by 304c prior to output. ’492 patent at Fig. 3 [A00253]. This is exactly what the patentees were referring to during prosecution of the ’492 patent. At no point did the

patentees disclaim that the “display format” could not be a format that would require deconstruction and reassembly after receipt by the alternative display terminal. As explained *infra*, such a disclaimer by the patentees would exclude the preferred embodiment.

The term “display format” simply requires a decompressed encoded video signal that is in a format different from the mobile terminal signal format originally received. As a result, the district court’s construction of “display format” was incorrect and should be rejected by this Court.

B. The District Court’s Construction of “Display Format” Excludes the Preferred Embodiment.

By imposing a negative construct on “display format” (i.e., that it excludes a format that requires deconstruction and reassembly at the alternative display), the district court construed “display format” in a manner that would exclude the preferred embodiments in the ’492, ’711, and ’268 patents. *See Accent Packaging*, 707 F.3d at 1326 (“a claim interpretation that excludes a preferred embodiment from the scope of the claim is rarely, if ever, correct”); *Rambus Inc. v. Rea*, 731 F.3d 1248, 1253 (Fed. Cir. 2013) (holding same).

As discussed *supra* in reference to Figure 3, the preferred embodiment involves receiving a video signal appropriate for a mobile terminal, decoding that video signal to a decompressed format at 304a, re-encoding the signal at 304c, and outputting the decompressed encoded signal, which is in a display format for the

alternative display. '492 patent at Fig. 3 [A00253]. One of the exemplary display formats disclosed in the preferred embodiment is HDMI (High Definition Multimedia Interface). *Id.*; *Id.* at 6:37-40 [A00260].

As the '492 patent specification makes clear, HDMI is a “display format.” *Id.* at 6:37-40 [A00260]. Once an HDMI signal is received by an alternative display, it must be decoded / deconstructed by the alternative display. Plaintiff’s Memorandum in Opposition to Samsung’s Motion for Partial Summary Judgment, 2:13-cv-332 [A04923-24]. In addition, prior to displaying the video content, the alternative display must reassemble the data contained in the HDMI signal and encode it according to LVDS (low voltage differential signaling) in order for the content to ultimately be displayed on an alternative display, such as an LCD screen. VIS II Opening Expert Report of Arthur T. Brody [A04956]. In other words, an HDMI signal is deconstructed and reassembled at the alternative display. Plaintiff’s Memorandum in Opposition to Samsung’s Motion for Partial Summary Judgment, 2:13-cv-332 [A04923-24]. HDMI, a display format in the preferred embodiment, would therefore fall outside the scope of the district court’s construction of “display format.” '492 patent at Fig. 3 [A00253]; *id.* at 6:37-40 [A00260].

In addition, the district court’s construction of “display format” would exclude at least one claim of the '268 patent and/or render it indefinite. Claim 27

of the '268 patent specifically claims "HDMI" as a limitation. '268 patent at Claim 27 [A00292]. It requires that "providing the converted video signal from the processing unit to the alternative display terminal is through a high definition multimedia interface (**HDMI**)." *Id.* (emphasis added). The district court's construction excludes HDMI. As a result, under the district court's construction it would be impossible for the processing unit, which must provide the converted video signal in a display format for the alternative display to the alternative display, to output the converted video signal via HDMI. As such, the district court's construction is also contrary to the longstanding maxim that claims should be construed to maintain their validity. *See e.g., Rhine v. Casio, Inc.*, 183 F.3d 1342, 1345 (Fed. Cir. 1999).

III. THE DISTRICT COURT ERRED IN GRANTING SUMMARY JUDGMENT OF NO INFRINGEMENT BECAUSE MHL IS A "DISPLAY FORMAT," WHEN PROPERLY CONSTRUED.

A. The Proper Construction of "Display Format" Is a Decompressed Encoded Video Signal that Is Different from the Mobile Terminal Signal Originally Received.

The proper construction of the term "display format" is a decompressed encoded video signal that is different from the mobile terminal signal originally received. This construction is consistent with the intrinsic evidence, including the patentees' statements during prosecution of the '492 patent. *See, e.g.,* '492 patent at Fig 3 [A00253]; *id.* at 6:6-40 [A00260].

As shown in Figure 3, the video signals output by the MTSCM (i.e., video signals that are in a display format for the alternative display) are decompressed encoded signals (e.g., HDMI, DVI, etc.). *Id.* at Fig 3 [A00253]. The MTSCM receiving a compressed video signal, which is passed to a Video Compress Decoder that “outputs a decompressed digital multimedia signal that is passed to the Digital/Analog Video Encoder (DAVE) 304b and/or the Digital/Digital Video Encoder (DDVE) 304c.” *Id.* at 6:26-29 [A00260]. Then the encoders receive “the decompressed multimedia signal and convert the signals to the format(s) and signal power level(s) required for the terminals to which they interface.” *Id.* at 6:33-36 [A00260]. All that is required is that the converted video signal output by the MTSCM be different than the compressed signal originally received by the mobile terminal. *Id.* at Claim 23 [A00262]. The district court erred by adding extraneous, negative limitations.

As a result, the district court’s construction of “display format” should be rejected, and this Court should construe the term “display format” to mean a decompressed encoded video signal that is different from the mobile terminal signal originally received by the mobile terminal.

B. MHL Is a “Display Format.”

Applying the proper construction of “display format,” it is clear that MHL is a “display format.” As described *supra*, the patents-in-suit use “display format” to

describe a decompressed encoded signal format that is different than the mobile terminal signal format originally received by the mobile terminal. '492 patent at Claim 23 [A00262]; '711 patent at Claim 15 [A00277]; '268 patent at Claim 21 [A00292].

It is undisputed that MHL is a decompressed signaling format. VIS II Opening Expert Report of Arthur T. Brody [A04959]; VIS II Summary Judgment Ruling at [A00124]. It is also undisputed that MHL is an encoded signaling format (i.e., it is encoded according to MHL requirements). VIS II Opening Expert Report of Arthur T. Brody [A04988]; VIS II Summary Judgment Ruling at [A00120]. Moreover, the uncompressed MHL signal output by the accused MHL-enabled products is different than the compressed video signal originally received by the accused MHL-enabled products.

The accused MHL-enabled products receive an incoming compressed video signal in, for example, MPEG format. *See, e.g.*, VIS II Opening Expert Report of Arthur T. Brody [A04987]. The accused MHL-enabled products decompress the received video signal, encode the decompressed video signal according to MHL requirements, and output the decompressed encoded video signal via the mobile phone's MHL output interface. *Id.* at [A04987-88].

When “display format” is properly construed, it is clear that MHL is a “display format.” As a result, the district court’s finding of no infringement should be rejected.

IV. THE DISTRICT COURT ERRED IN GRANTING SUMMARY JUDGMENT OF INVALIDITY BECAUSE PALIN DOES NOT DISCLOSE THE “CONVERSION” LIMITATION OF CLAIM 21 OF THE ’268 PATENT.

A. Palin Does Not Disclose the Required “Conversion” Limitation of Claim 21.

Claim 21 of the ’268 patent requires in part:

a processing unit for processing the video signal to produce a converted video signal for use by the alternative display terminal, wherein the processing includes converting a signal format appropriate for the mobile terminal to a display format for the alternative display terminal that is different from the signal format, the display format being a high definition digital format, ...

’268 patent at Claim 21 [A00292]. Claims 22, 25, 28, and 29 of the ’268 patent depend from Claim 21 and therefore require every limitation of Claim 21. *Id.* Palin does not disclose a “converted video signal,” let alone “converting a signal format appropriate for the mobile terminal to a display format for the alternative display that is different from the signal format.” ’492 IPR Decision at [A05516-17]. In Palin there is no conversion of a video signal whatsoever. *Id.* The mobile phone receives two separate video signals (i.e., Mobile Phone Part 54 and TV

Receiver Part 56) that are never converted. Palin at Fig. 4(b) [A02187]; *Id.* at 5:27-51 [A02195].

Palin is merely focused on file transfer, rather than conversion. As such, the only conversion in Palin is the conversion of a transport protocol. '492 IPR Decision at [A05516-17]. For example, TV Receiver Part 56, the only video signal that leaves the mobile phone in Palin, may have been received via Wi-Fi. Palin at 4:5-10, 5:51-55 [A02194-95]. It then leaves via Bluetooth. *Id.* at 5:58-61 [A02195]. In this instance, the transport protocol (e.g., Wi-Fi, 3G, 4G, Bluetooth) has changed, but the underlying video signal format (e.g., MPEG-2, MPEG-4, etc.) remains the same. '492 IPR Decision at [A05516-17]. In contrast, the '268 patent is focused on conversion of the video signal format. '268 patent at Fig. 3 [A00283]; *id.* at 6:9-43 [A00290]. For example, in the '268 patent the mobile terminal may receive a compressed video signal in MPEG-2 format. *Id.* at 6:10-14 [A00290]. It then converts that video signal to a decompressed video signal in HDMI format. *Id.* at 6:29-43 [A00290]. This is a conversion of the video signal, which is not disclosed in Palin.

The PTAB reached this same conclusion. Samsung moved for *inter partes* review of the asserted claims of the '492, '711, and '268 patents based on Palin. '492 IPR Decision at [A05508]; '711 IPR Decision at [A05528]; '268 IPR Decision at [A05551]. The PTAB denied Samsung's attempts to invalidate the

asserted claims based solely on Palin.⁵ Most importantly, the PTAB concluded that Palin does not disclose the required conversion. '492 IPR Decision at [A05516-17]. The PTAB stated:

Even assuming that the format of the video signal contained in external display device part 56 is in “a compression format appropriate for the mobile terminal,” **the video signal is not “converted” because external display device parts 56 output to external display device 30 are the same external display device parts 56 received by mobile terminal 20.**

...

Indeed, the specification repeatedly differentiates between converting signal formats and routing via a communications protocol. Ex. 1001 ['492 patent], col. 3, ll. 33-46, col. 21, ll. 33-40, col. 26, ll. 28-32 and 59-63, col. 27, ll. 1-16. When this definition is applied to Palin, even after splitting, the first display device part(s) and second display device part(s) of Palin **retain their original form such that they can still be displayed on their respective devices.** The same analysis applies if Petitioner is attempting to assert that reassembling one or more external display device parts 56 into one or more Bluetooth-compliant packets corresponds to the recited converting.

Id. (emphasis added). The only video signal that leaves the mobile phone in Palin, TV Receiver Part 56, is the same TV Receiver Part 56 that the mobile phone originally received. *Id.* It is never converted. Conversely all asserted claims of the '492, '711, and '268 patents require conversion. '492 patent [A00262]; '711 patent [A00277]; '268 patent [A00292]. The PTAB reached this conclusion while

⁵ The PTAB rejected Samsung's IPR requests in their entirety with respect to the '492 and '711 patents. '492 IPR Decision at [A05519]; '711 IPR Decision at [A05541-42]. The PTAB rejected Samsung's request that claim 21 of the '268 patent be invalidated based solely on Palin. '268 IPR Decision at [A05561-62].

applying the “broadest reasonable interpretation” standard to the “conversion” limitation as well as a lower threshold for invalidity (i.e., preponderance of the evidence). *See* 37 CFR § 42.100(b) (broadest reasonable interpretation standard applies in IPRs); 35 U.S.C. § 316(e) (preponderance of evidence standard applies in IPRs). This is a broader standard than that applied by the district court in its summary judgment ruling. *See Phillips*, 415 F.3d at 1312-18 (describing claim construction standard to be applied by district courts); *Microsoft Corp. v. i4i Ltd. P'ship*, 131 S.Ct. 2238, 2246 (2011) (invalidity must be shown by clear and convincing evidence).

In sum, despite applying a broader interpretation of the claims and a lower threshold for establishing invalidity, the PTAB concluded that Palin did not disclose a “converted video signal.” ’492 IPR Decision at [A05516-17]. The PTAB’s IPR decisions highlight that, at a minimum, genuine issues of material fact exist as to whether Palin discloses each and every limitation of claims 21, 22, 25, 28, and 29 of the ’268 patent. Accordingly, the district court’s summary judgment ruling that Palin anticipates these claims was improper and should be reversed.

B. The District Court’s Invalidity Order Is Inconsistent — Palin Does Not Disclose the Required “Display Format” Limitation of Claim 21.

The district court’s summary judgment ruling regarding invalidity is also internally inconsistent. This is another reason it should be reversed. In granting

summary judgment of invalidity with respect to claim 21 of the '268 patent, the district court ignored its own finding that a “display format” must be a decompressed format and that Palin does not disclose decompression at the mobile terminal. VIS I Summary Judgment Ruling at [A00044].

Palin only discloses outputting a compressed video signal (i.e., TV Receiver Part 56 in a compressed format). *Id.* at [A00056]. The district court explicitly found that “Palin does not teach decompression at the mobile terminal prior to sending the signal to the television.” *Id.* at [A00057].⁶ The district court also explicitly found, twice, that a “display format,” as taught by the asserted patents, must be a decompressed format. VIS II Summary Judgment Ruling at [A00122]; VIS I Summary Judgment Ruling at [A00044]. Specifically, in its summary judgment order on invalidity the district court stated:

Specifically, the evidence before the Court indicates that a video in a display format must be uncompressed, and the Court finds this evidence compelling.

VIS I Summary Judgment Ruling at [A00044]. Claim 21 of the '268 patent requires that the converted video signal be in a “display format” (i.e., an uncompressed format). In other words, claim 21 requires that the video signal be converted to a decompressed format prior to transmission to the television. '268 patent at Claim 21 [A00292]. This is the very basis on which the district court

⁶ This was the district court’s basis for finding that Palin did not anticipate the asserted claims from the '492 and '711 patents.

denied summary judgment for the asserted claims of the '492 and '711 patents.

VIS I Summary Judgment Ruling at [A00054-55].

As a result, based on the district court's own findings, as well as those of the PTAB, Palin cannot anticipate claim 21 of the '268 patent and the district court's summary judgment ruling must be reversed.

CONCLUSION AND RELIEF SOUGHT

For the foregoing reasons, Appellant respectfully requests that this Court:

1. Reverse the district court's final judgment;
2. Reverse the district court's construction of the term "display format";
3. Reverse the district court's finding of summary judgment of no infringement;
4. Reverse the district court's finding of summary judgment of invalidity with respect to claim 21 of the '268 patent; and
5. Remand this case back to the United States District Court for the Eastern District of Virginia for trial.

CERTIFICATE OF SERVICE

The undersigned hereby certifies that on July 14, 2014, two copies of the foregoing were served by Federal Express overnight delivery upon counsel for Appellee addressed as follows:

Brett J. Williamson
O'Melveny & Myers LLP
610 Newport Center Drive, 17th Floor
Newport Beach, California 92660

The undersigned hereby certifies that on July 14, 2014, the original and eleven copies of the foregoing were served by Federal Express overnight delivery to the Clerk of the Court, U.S. Court of Appeals – Federal Circuit at the below address:

United States Court of Appeals for the Federal Circuit
Clerk of Court
717 Madison Place, N.W.
Washington D.C. 20439

Dated: July 14, 2014

/s/Timothy E. Grochocinski
Timothy E. Grochocinski

Counsel for Virginia Innovation Sciences, Inc., Appellant-Plaintiff

**CERTIFICATE OF COMPLIANCE WITH TYPE-VOLUME
LIMITATION, TYPEFACE REQUIREMENTS AND TYPE STYLE
REQUIREMENTS**

1. This brief complies with the type-volume limitation of Federal Rule of Appellate Procedure 32(a)(7)(B).

The brief contains 7,395 words, excluding the parts of the brief exempted by Federal Rule of Appellate Procedure 32(a)(7)(B)(iii).

2. This brief complies with the typeface requirements of Federal Rule of Appellate Procedure 32(a)(5) and the type style requirements of Federal Rule of Appellate Procedure 32(a)(6).

The brief has been prepared in proportionally spaced typeface using MS Word – Office 365 in Times New Roman 14 Point Font.

Dated: July 14, 2014

/s/Timothy E. Grochocinski

Timothy E. Grochocinski

Counsel for Virginia Innovation Sciences, Inc., Appellant-Plaintiff

ADDENDUM

UNITED STATES DISTRICT COURT
EASTERN DISTRICT OF VIRGINIA
Norfolk Division

VIRGINIA INNOVATION
SCIENCES, INC.,

Plaintiff,
v.

Case No.: 2:12cv548

SAMSUNG ELECTRONICS CO.,
LTD., ET AL.,

Defendants.

OPINION AND ORDER

This matter is currently before the Court on a motion for summary judgment filed by Samsung Electronics Co., Ltd., Samsung Electronics America, Inc., and Samsung Telecommunications America, LLC (collectively "Samsung" or "Defendants"). ECF No. 134. The motion has been fully briefed and is therefore ripe for decision.

After examination of the briefs and the record, the Court determines that a hearing is unnecessary, as the facts and legal arguments are adequately presented, and the decisional process would not be aided significantly by oral argument. See Fed. R. Civ. P. 78(b); E.D. Va. Loc. Civ. R. 7(J). For the reasons that follow, Defendants' motion seeking summary judgment is **GRANTED**, in part, and **DENIED**, in part.

I. FACTUAL BACKGROUND

At issue in this case are five¹ patents: U.S. Patent No. 7,899,492 ("the '492 patent"), U.S. Patent No. 8,050,711 ("the '711 patent"), U.S. Patent No. 8,145,268 ("the '268 patent"), U.S. Patent No. 8,224,381 ("the '381 patent"), and U.S. Patent No. 8,135,398 ("the '398 patent"). All of the patents-in-suit claim priority to the '492 patent, which itself claimed priority to provisional application number 60/588,359, filed on July 16, 2004. The '711, '268, and '381 patents are continuations of the '492 patent and all four share a substantively identical specification ("the '492 specification"). U.S. Patent No. 7,957,733 ("the '733 patent"), which is not at issue in this case, was filed on May 22, 2007 as a continuation-in-part of the '492 patent. The '398 patent is a continuation from the '733 patent. The shared specification of the '733 and '398 patents ("the '398 specification") includes all of the '492 specification along with additional material. It is the addition of this new material which prevents the '398 patent from claiming priority back to the filing of the '492 patent and entitles it to the later priority date of May 22, 2007, the filing date of the '733 patent. Each of the patents-in-suit describes inventions intended to resolve the inconvenience and

¹ Previously, there were six patents at issue in this case. However, U.S. Patent No. 7,957,733 ("the '733 patent") is no longer asserted as infringed. Agreed Dismissal Order, ECF. No. 408.

impracticability of viewing multimedia content on the small screens of mobile terminals.

A. The '492 Patent Family

The '492, '711, '268, and '381 patents (collectively, "the '492 patent family") are each titled "Methods, Systems and Apparatus for Displaying Multimedia Information from Wireless Communication Networks." Their shared specification and respective claims are directed toward methods, systems, apparatuses, and computer-readable mediums that can be utilized to convert multimedia signals, appropriate for displaying content on a mobile terminal, into signals appropriate for display on an alternative display terminal.

B. The '398 Patent

The '398 patent is entitled "Methods and Apparatus for Multimedia Communications with Different User Terminals." Its specification and claims are directed toward methods, systems, apparatuses, computer programs, and computer-readable mediums for providing "multimedia content to and from various different devices" through the conversion and sending or routing of such content. E.g., '398 patent 1:47-49. As noted above, the '398 patent issued from a continuation of the '733 patent, which was itself a continuation-in-part of the '492 patent. Id. at 1:21-31. Thus, the '398 patent claims priority to the filing date of the '733 patent, May 22, 2007. However, it may claim priority

back to the filing date of the '492 patent for claims the subject matter of which flow directly from the '492 patent. Tech Licensing Corp. v. Videotek, Inc., 545 F.3d 1316, 1326 (Fed. Cir. 2008) ("In essence, [35 U.S.C. § 120] means that in a chain of continuing applications, a claim in a later application receives the benefit of the filing date of an earlier application so long as the disclosure in the earlier application meets the requirements of 35 U.S.C. § 112, ¶ 1, including the written description requirement, with respect to that claim."); see also, Cordance Corp. v. Amazon.com, Inc., 658 F.3d 1330, 1334 (Fed. Cir. 2011).

II. PROCEDURAL HISTORY

In the instant patent infringement action, plaintiff Virginia Innovation Sciences, Inc. (hereinafter "Plaintiff" or "VIS") alleges that Defendants have directly, indirectly, and willfully infringed the patents-in-suit by making, using, offering for sale, selling, and/or importing a wide range of accused products, including smartphones, tablets, Blue-ray players, and hubs. Samsung denies VIS's claims of infringement and asserts several affirmative defenses, including invalidity of all patents-in-suit, prosecution history estoppel and other equitable doctrines. Additionally, Samsung asserts counterclaims seeking declarations of non-infringement and invalidity for each of the patents-in-suit.

The Court held its Markman hearing in this matter on June 11, 2013 and issued its Markman opinion on September 25, 2013. ECF No. 198. Since the Markman hearing, there have been numerous filings in this matter and several motions remain pending before the Court, in various stages of briefing. By Order of October 25, 2013, the Court joined for trial this matter and Virginia Innovation Sciences, Inc. v. Samsung Electronics Co., Ltd., et al., Case No. 2:13cv322. ECF No. 353. The trial of the two matters is now set for April 21, 2014. On November 15, 2013 the Court ruled on Defendants' Motion to Dismiss VIS's Claim for Willful Infringement; granting, in part, and denying, in part such motion. ECF No. 395. The Court found that the claim for willful infringement failed to state a plausible claim for relief with regard to willful infringement of the '711, '268, and '381 patents.

After first reciting the applicable standard of review, the Court will address the Defendants' Motion for Summary Judgment of Patent Invalidity and No Willful Infringement filed August 13, 2013 and the associated responses and briefs. ECF No. 134, 135, 144, 159, 163, and 168.

III. STANDARD OF REVIEW

A. Summary Judgment

The Federal Rules of Civil Procedure provide that a district court shall grant summary judgment in favor of a movant

if such party "shows that there is no genuine dispute as to any material fact and the movant is entitled to judgment as a matter of law." Fed. R. Civ. P. 56(a). The mere existence of some alleged factual dispute between the parties "will not defeat an otherwise properly supported motion for summary judgment; the requirement is that there be no genuine issue of material fact." Anderson v. Liberty Lobby Inc., 477 U.S. 242, 247-48 (1986). Furthermore, the standard at summary judgment requires that the evidence be viewed in favor of the nonmovant and that all justifiable inferences be drawn in his favor. Anderson, 477 U.S. at 255.

If a movant has properly advanced evidence supporting entry of summary judgment, the non-moving party may not rest upon the mere allegations of the pleadings, but instead must set forth specific facts in the form of exhibits and sworn statements illustrating a genuine issue for trial.² Celotex Corp. v. Catrett, 477 U.S. 317, 322-24 (1986). At that point, "the judge's function is not himself to weigh the evidence and determine the truth of the matter but to determine whether there is a genuine issue for trial." Anderson, 477 U.S. at 249. In doing so, the judge must construe the facts and all "justifiable

² "When a motion for summary judgment is properly made and supported, an opposing party may not rely merely on allegations or denials in its own pleading; rather, its response must—by affidavits or as otherwise provided in this rule—set out specific facts showing a genuine issue for trial." Fed. R. Civ. P. 56(e)(2).

"inferences" in the light most favorable to the non-moving party, and the judge may not make credibility determinations. *Id.* at 255; T-Mobile Northeast LLC v. City Council of City of Newport News, Va., 674 F.3d 380, 385 (4th Cir. 2012). "Summary judgment will not lie if the dispute about a material fact is 'genuine,' that is, if the evidence is such that a reasonable jury could return a verdict for the nonmoving party." *Anderson*, 477 U.S. at 248. Moreover, because a ruling on summary judgment "necessarily implicates the substantive evidentiary standard of proof that would apply at the trial on the merits[,] . . . [t]he mere existence of a scintilla of evidence in support of the plaintiff's position will be insufficient" to overcome a defendants' well-founded summary judgment motion. *Anderson*, 477 U.S. at 252.

"In rendering a decision on a motion for summary judgment, a court must 'view the evidence presented through the prism of the substantive evidentiary burden' that would inhere at trial." *Apple Computer, Inc. v. Articulate Sys., Inc.*, 234 F.3d 14, 20 (Fed. Cir. 2000) (quoting *Monarch Knitting Mach. Corp. v. Sulzer Morat GmbH*, 139 F.3d 877, 880, (Fed. Cir. 1998) (quoting *Anderson*, 477 U.S. at 254)). Therefore, the Court must now examine each applicable evidentiary burden.

B. Patent Invalidity

"Among other defenses under § 282 of the Patent Act of 1952

(1952 Act), an alleged infringer may assert the invalidity of the patent—that is, he may attempt to prove that the patent never should have issued in the first place.” Microsoft Corp. v. i4i Ltd. P'ship, 131 S. Ct. 2238, 2242 (2011) (citing 35 U.S.C. §§ 282(2), (3)). Defendants assert the invalidity of the patents-in-suit.

A patent is presumed valid upon issuance from the United States Patent and Trademark Office. 35 U.S.C. § 282. Overcoming this presumption requires the party seeking to invalidate a patent to prove invalidity by clear and convincing evidence. i4i Ltd. P'ship, 131 S. Ct. at 2246. This same standard applies at the summary judgment stage. Invitrogen Corp. v. Biocrest Mfg., L.P., 424 F.3d 1374, 1378 (Fed. Cir. 2005). Thus, in order to prevail at the summary judgment stage, the party seeking summary judgment on the issue of patent invalidity “must submit such clear and convincing evidence of invalidity so that no reasonable jury could find otherwise.” Eli Lilly & Co. v. Barr Labs., Inc., 251 F.3d 955, 962 (Fed. Cir. 2001); Apple Computer, Inc., 234 F.3d at 20.

Before addressing the factual questions of anticipation and obviousness, the necessary first step in considering patent validity or invalidity is to determine the proper meaning of the relevant disputed claim terms. Akamai Techs., Inc. v. Cable & Wireless Internet Servs., Inc., 344 F.3d 1186, 1195 n.4 (Fed.

Cir. 2003). As claim construction is a matter of law, Markman v. Westview Instruments Inc., 52 F.3d 967, 979 (Fed. Cir. 1995) (en banc), summary judgment is particularly appropriate where the only real dispute between parties concerns the proper meaning of patent claims. See Voice Techs. Group, Inc. v. VMC Sys., Inc., 164 F.3d 605, 612 (Fed. Cir. 1999) (considering infringement at summary judgment stage). Although Voice Techs. Group, Inc. concerns the issue of infringement at the summary judgment stage, the Federal Circuit's reasoning is equally applicable to the issue of patent validity at the summary judgment stage.

i. Invalidity Based on Anticipation

Patent invalidity due to anticipation under 35 U.S.C. § 102 is a question of fact rather than a question of law. Enzo Biochem, Inc. v. Applera Corp., 599 F.3d 1325, 1331 (Fed. Cir. 2010). However, "[w]hile anticipation is a question of fact, it may be decided on summary judgment if the record reveals no genuine dispute of material fact." Enzo Biochem, Inc., 599 F.3d at 1331 (quoting Leggett & Platt, Inc. v. VUTEK, Inc., 537 F.3d 1349, 1352 (Fed. Cir. 2008)).

"A determination that a claim is anticipated involves a two-step analysis: 'the first step requires construing the claim,' and '[t]he second step in the analysis requires a comparison of the properly construed claim to the prior

art....'" Enzo Biochem, Inc., 599 F.3d at 1332 (quoting Power Mosfet Techs., LLC v. Siemens AG, 378 F.3d 1396, 1406 (Fed. Cir. 2004)). "A patent is invalid for anticipation if a single prior art reference discloses each and every limitation of the claimed invention." Schering Corp. v. Geneva Pharm., 339 F.3d 1373, 1377 (Fed. Cir. 2003) (citing Lewmar Marine, Inc. v. Bariant, Inc., 827 F.2d 744, 747 (Fed. Cir. 1987)). However,

[i]f the prior art reference does not expressly set forth a particular element of the claim, that reference still may anticipate if that element is "inherent" in its disclosure. To establish inherency, the extrinsic evidence "must make clear that the missing descriptive matter is necessarily present in the thing described in the reference, and that it would be so recognized by persons of ordinary skill." Continental Can Co. v. Monsanto Co., 948 F.2d 1264, 1268, 20 U.S.P.Q.2d 1746, 1749 (Fed.Cir.1991). "Inherency, however, may not be established by probabilities or possibilities. The mere fact that a certain thing may result from a given set of circumstances is not sufficient." *Id.* at 1269, 948 F.2d 1264, 20 U.S.P.Q.2d at 1749 (quoting In re Oelrich, 666 F.2d 578, 581, 212 U.S.P.Q. 323, 326 (C.C.P.A.1981)).

In re Robertson, 169 F.3d 743, 745 (Fed. Cir. 1999).

Furthermore, "inherent anticipation does not require that a person of ordinary skill in the art at the time would have recognized the inherent disclosure." Schering Corp., 339 F.3d at 1377 (emphasis added) (citing "e.g., In re Cruciferous Sprout Litig., 301 F.3d 1343, 1351 (Fed. Cir. 2002); MEHL/Biophile Int'l Corp. v. Milgraum, 192 F.3d 1362, 1366 (Fed. Cir. 1999)

('Where ... the result is a necessary consequence of what was

deliberately intended, it is of no import that the article's authors did not appreciate the results.'")). Moreover, it is not necessary that the inherent disclosure was recognized by a person having ordinary skill in the art before the critical date of the patent as long as the scope of the prior art includes disclosure of the inherent feature.³ Schering Corp., 339 F.3d at 1377-78 (citing Continental Can Co. v. Monsanto Co., 948 F.2d 1264, 1268-69 (Fed. Cir. 1991)). Because "inherency, like anticipation itself, requires a determination of the meaning of the prior art," the Court "may resolve factual questions about the subject matter in the prior art by examining the reference through the eyes of a person of ordinary skill in the art, among other sources of evidence about the meaning of the prior art." Schering Corp., 339 F.3d at 1377.

ii. Invalidity Based on Obviousness

A patent is invalid based on obviousness "if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter

³ See Atlas Powder Co. v. Ireco, Inc., 190 F.3d 1342, 1349 (Fed. Cir. 1999) ("Once it is recognized that interstitial and porous air were inherent elements of the prior art compositions, the assertion that air may act as a sole sensitizer amounts to no more than a claim to the discovery of an inherent property of the prior art, not the addition of a novel element. Insufficient prior understanding of the inherent properties of a known composition does not defeat a finding of anticipation.").

pertains." 35 U.S.C. § 103(a). While the obviousness inquiry is ultimately a legal determination, it is predicated on underlying factual findings that are unique to each patent case.

KSR Int'l Co. v. Teleflex Inc., 550 U.S. 398, 406-07 (2007).

However, "a district court can properly grant, as a matter of law, a motion for summary judgment on patent invalidity when the factual inquiries into obviousness present no genuine issue of material facts." Tokai Corp. v. Easton Enterprises, Inc., 632 F.3d 1358, 1366 (Fed. Cir. 2011) (quoting Ryko Mfg. Co. v. Nu-Star, Inc., 950 F.2d 714, 716 (Fed. Cir. 1991)); accord Union Carbide Corp. v. Am. Can Co., 724 F.2d 1567, 1571 (Fed. Cir. 1984); Chore-Time Equip., Inc. v. Cumberland Corp., 713 F.2d 774, 778-79 (Fed. Cir. 1983).

Because a patent enjoys a statutory presumption of validity, 35 U.S.C. § 282, an alleged infringer seeking to establish that a patent is invalid as obvious must overcome the presumption of validity "by clear and convincing evidence," Innovention Toys, LLC v. MGA Entm't, Inc., 637 F.3d 1314, 1320 (Fed. Cir. 2011). Thus, to establish a prima facie case of obviousness, the burden is on the alleged infringer to establish, by clear and convincing evidence, that a skilled artisan would have both been motivated to combine the prior art and have a reasonable expectation of success in doing so. Kinetic Concepts, Inc. v. Smith & Nephew, Inc., 688 F.3d 1342,

1360 (Fed. Cir. 2012).⁴

The following four-factor test guides the obviousness inquiry: "(1) the scope and content of the prior art, (2) the differences between the prior art and the claims at issue, (3) the level of ordinary skill in the art, and (4) any relevant secondary considerations, such as commercial success, long felt but unsolved needs, and the failure of others." Wyers v. Master Lock Co., 616 F.3d 1231, 1237 (Fed. Cir. 2010) (citing Graham v. John Deere Co., 383 U.S. 1, 17-18 (1966)) (hereinafter "the Graham factors"). Indeed, the Federal Circuit has explained that courts are required to consider all four of the Graham factors prior to reaching a conclusion with respect to obviousness. In re Cyclobenzaprine Hydrochloride Extended-Release Capsule Patent Litig., 676 F.3d 1063, 1076-77 (Fed. Cir. 2012).

C. Willful Infringement

The Federal Circuit established the current standard for willful infringement in In re Seagate, in which the Court "overrule[d] the standard set out in Underwater Devices" and, in so doing, "abandon[ed] the affirmative duty of due care." In re Seagate Tech., LLC, 497 F.3d 1360, 1371 (Fed. Cir. 2007). The

⁴ While it remains appropriate to analyze any "teaching, suggestion, or motivation to combine elements from different prior art references," the Supreme Court's opinion in KSR made clear that such considerations are not rigid requirements, and the "overall inquiry must be expansive and flexible." Kinetic Concepts, 688 F.3d at 1360.

Federal Circuit held "that proof of willful infringement permitting enhanced damages requires at least a showing of objective recklessness," which requires meeting a threshold objective standard and a subsequent subjective standard. Id. The threshold objective standard requires that, in order to establish willful infringement, "a patentee must show by clear and convincing evidence that the infringer acted despite an objectively high likelihood that its actions constituted infringement of a valid patent." Id. "If this threshold objective standard is satisfied, the patentee must also demonstrate that this objectively-defined risk (determined by the record developed in the infringement proceeding) was either known or so obvious that it should have been known to the accused infringer." Id.

Following Seagate, the Federal Circuit "established the rule that generally the 'objective prong of Seagate tends not to be met where an accused infringer relies on a reasonable defense to a charge of infringement.'" Bard Peripheral Vascular, Inc. v. W.L. Gore & Associates, Inc., 682 F.3d 1003, 1005-06 (Fed. Cir. 2012) cert. denied, 133 S. Ct. 932 (2013) (quoting Spine Solutions, Inc. v. Medtronic Sofamor Danek USA, Inc., 620 F.3d 1305, 1319 (Fed. Cir. 2010)).

IV. DISCUSSION

A. Invalidity of '492 Patent Family

The priority date of a patent functions as a cut-off date for what may qualify as a prior art reference. See 35 U.S.C. § 102. Where patents share a priority date, they are therefore subject to the same prior art references. Because the '492, '268, '711, and '381 patents share a common priority date, as members of the '492 patent family, they are subject to the same prior art references. It is for this reason that the Court will consider the '492, '268, '711, and '381 patents, and the prior art references asserted against them, together. However, it should be emphasized that the applicability of each prior art reference is still determined with regard to each claim individually.

As stated above, the party seeking summary judgment on the issue of patent invalidity "must submit such clear and convincing evidence of invalidity so that no reasonable jury could find otherwise." Eli Lilly & Co., 251 F.3d at 962. However, before addressing the questions of anticipation and obviousness, the necessary first step in considering patent validity or invalidity is to determine the proper meaning of the relevant disputed claim terms. Akamai Techs., Inc., 344 F.3d at 1195 n.4.

i. Construction of Claim Terms

The Court resolved the construction of the majority of the disputed claim terms through the issuance of its Markman opinion on September 25, 2013. However, a new dispute has arisen over the course of the parties' submissions on Samsung's Motion for Summary Judgment.

VIS asserts that decompression of the video signal is a required limitation of all of its asserted claims. Pl. Virginia Innovation Sciences Inc.'s Mem. In Opp. to Def.'s Mot. for Summ. J. ("Mem. in Opp.") at 15, ECF No. 163. More specifically, VIS asserts that the conversion from a signal format appropriate for the mobile terminal to a display format for output to the alternative display inherently requires conversion from a compressed format, e.g. the signal format, to an uncompressed format, e.g. the display format. Id. at 16. Samsung argues this assertion by VIS constitutes an argument for a different claim construction than that already determined by the Court, in its Markman Opinion, for the term "converted video signal." Rebuttal Br. in Supp. of Samsung's Mot. for Summ. J. ("Rebuttal Br.") at 6-7, ECF No. 168. However, VIS's argument is based not on the term "converted video signal," but on the remaining language in the claims setting forth additional limitations beyond those included through the term "converted video signal" alone. Although conversion is the necessary process for

obtaining the product, a "converted video signal," there is no rule which prevents a claim from including additional limitations beyond those set forth as the baseline in the Court's claim construction. In this case, the claim construction of the term "converted video signal" sets forth the minimum baseline regarding what must take place during the processing for the video signal to be considered "converted."⁵ Thus, the inclusion of additional limiting language in the claims requiring the additional step of decompression beyond the baseline contemplated by the Court's construction of the term "converted video signal" would not require a change to the Court's construction of the term in its Markman Opinion. Moreover, while this issue might have been raised by the parties for resolution during claim construction, the Court has discretion to address it during consideration of a summary judgment motion. See Stern v. SeQual Technologies, Inc., 840 F. Supp. 2d 1260, 1266 (W.D. Wash. 2012) aff'd, 493 F. App'x 99 (Fed. Cir. 2012); SanDisk Corp. v. Memorex Products, Inc., 415 F.3d 1278, 1292 (Fed. Cir. 2005).

In support of their argument that conversion, as recited in the claims asserted, requires decompression, VIS cites to Figure 3 of the '492 specification, which shows receipt of a signal

⁵ In its Markman Opinion, the Court gave the term "converted video signal" its plain and ordinary meaning, which is "a video signal that has been changed." Markman Opinion at 44 & 52, ECF No. 198.

through a wireless network, processing by Video Compress Decoder, 304a, and transmission of the video signal to the display via an uncompressed format. Mem. in Opp. at 17, ECF No. 163. There is undoubtedly support in the '492 specification for an embodiment requiring processing of the video signal from a compressed format to an uncompressed format during conversion of the video signal, specifically Figure 3 and the associated description of that Figure at 5:44-6:47 of the '492 specification. Furthermore, "[w]hile it is true, of course, that 'the claims define the scope of the right to exclude' and that 'the claim construction inquiry, therefore, begins and ends in all cases with the actual words of the claim,' Renishaw PLC v. Marposs Societa' per Azioni, 158 F.3d 1243, 1248 (Fed.Cir.1998), the written description can provide guidance as to the meaning of the claims, thereby dictating the manner in which the claims are to be construed." SciMed Life Sys., Inc. v. Advanced Cardiovascular Sys., Inc., 242 F.3d 1337, 1344 (Fed. Cir. 2001). However, the courts have repeatedly stated that "limitations from the specification are not to be read into the claims." Comark Commc'nns, Inc. v. Harris Corp., 156 F.3d 1182, 1186 (Fed. Cir. 1998) (citing E.I. du Pont de Nemours & Co. v. Phillips Petroleum Co., 849 F.2d 1430, 1433 (Fed. Cir. 1988)). The Federal Circuit has gone so far as to characterize "reading a limitation from the written description into the claims" as

"one of the cardinal sins of patent law." SciMed Life Sys., Inc., 242 F.3d at 1340 (citing Comark Communic'ns, Inc., 156 F.3d at 1186). Thus, in construing the claims, the most important question for the Court to consider is whether decompression is a limitation encompassed by the language of the claims asserted by VIS, without reading limitations from the specification into the claims.

Language describing conversion of the video signal from a signal format to a display format appears in some form in the processing element of every independent claim relevant to VIS's asserted claims.⁶ However, as the specific language used in the independent claims differs with regards to this element, each claim must be evaluated individually with regard to the asserted decompression limitation.

1. '492 Patent, Claim 23

The '492 patent's independent claim, claim 23, uses the following language with regard to the processing element:

"wherein processing by the signal conversion module includes converting the video signal from a compression format appropriate for the mobile terminal to a display format for the alternative display terminal that is different from the compression format, such that the converted video signal comprises a display format and a power level appropriate for driving the alternative display terminal."

⁶ All dependent claims asserted by VIS depend from an independent claim that is also asserted with one exception. The claims of the '381 patent which are asserted by VIS are dependent claims which depend from independent claim 15 of the '381 patent, however, claim 15 is not itself asserted in these motions.

'492 patent, 10:17-24. Specifically, the processing of the video signal in claim 23 must include "converting . . . from a compression format . . . to a display format . . . that is different from the compression format." Id. (emphasis added). In examining this claim language, it is clear that decompression is encompassed by the language of claim 23 and, thus, its dependent claims as well. It might be argued that a format different from the first compression format could simply constitute a different compression format, achievable through the performance of a process referred to as "transcoding"⁷ by an encoder. However, the requirement that it be in a display format after conversion seems to indicate otherwise as evidence has been presented indicating that a video must be decompressed before it may be displayed. Mem. In Opp., Ex. A at ¶ 14, ECF. No. 163. Specifically, the evidence before the Court indicates that a video in a display format must be uncompressed, and the Court finds this evidence compelling. Furthermore, the Court may examine relevant treatises addressing the art at issue. NTP, Inc. v. Research In Motion, Ltd., 418 F.3d 1282, 1293 (Fed. Cir. 2005) (citing Phillips v. AWH Corp., 415 F.3d 1303, 1314 (Fed. Cir. 2005) (en banc)). At the time of filing of the '492 patent, the process of transcoding itself required decompression

⁷ See Mem. In Opp., Ex. A-2 at ¶ 29, ECF. No. 163 ("Some encoders can also 'transcode' or change one compressed video signal format into another compressed video signal format.").

as a decoder would have to decode the compressed video before it can be re-coded in the different format.⁸ "When decoding, codecs and decoders convert compressed video signals into raw, uncompressed video signals." Mem. in Opp., Ex. A-2 at ¶ 29, ECF No. 159; see also '492 patent at 6:6-29; Rebuttal Br. at 9, ECF No. 168. Thus, the claim language not only encompasses decompression but requires it as a limitation of claim 23 of the '492 patent. Additionally, while, as Samsung argues, the specification describes "compress decoders" (which by definition first decompress the signals) separately from "encoders" (which convert the signals to the format(s) and power level(s) required by the terminals to which they interface), there is no language in the specification to indicate that they are mutually exclusive functions of the processing element of the claims, i.e. "converting the video signal" or "processing by the signal conversion module." Since there is no language in the specification indicating mutual exclusivity of the "compress decoders" and the encoders, and since there is no requirement

⁸ See, Xin, Jun, Chia-Wen Lin, & Ming-Ting Sun, "Digital Video Transcoding," **PROCEEDINGS OF THE IEEE**, Vol. 93, No. 1, January 2005 at 85, <<http://nthur.lib.nthu.edu.tw/bitstream/987654321/1/2030144010017.pdf>> retrieved December 30, 2013 (A research paper on a proposed method of transcoding wherein it describes the prior art transcoding and the problem with it as follows: "[a] straightforward realization of a transcoder to cascade a decoder and an encoder: the decoder decodes the compressed video input and the encoder reencodes the decoded video into the target format. It is computationally very expensive. Therefore, reducing the complexity of the straightforward decoder -encoder implementation is a major driving force behind many research activities on transcoding.").

that decompression occur in a separate step from the conversion performed by the encoders, the proposition that decompression must occur in the conversion process finds support in the specification.

2. '711 Patent, Claim 15

The '711 patent's independent claim, claim 15, uses the following language with regard to the processing element:

"wherein processing by the signal conversion hardware component includes converting the video signal from a compression format appropriate for the mobile terminal to a display format for the alternative display terminal that is different from the compression format, such that the converted video signal comprises the display format for the alternative display terminal."

'711 patent, 9:45-10:6. As this uses the same key language already discussed above with regard to claim 23 of the '492 patent, the same analysis applies here. Thus, decompression is a limitation of the conversion element required by the language in claim 15 of the '711 patent, as well as its dependent claims.

3. '268 Patent, Claim 21

The '268 patent's independent claim, claim 21, uses the following language with regard to the processing element:

"wherein the processing includes converting a signal format appropriate for the mobile terminal to a display format for the alternative display terminal that is different from the signal format, the display format being a high definition digital format, such that the converted video signal produced by the processing unit comprises the high definition digital format for output to the alternative display

terminal."

'268 patent, 10:18-25. Unlike the language discussed above with regard to claim 23 of the '492 patent and claim 15 of the '711 patent, claim 21 of the '268 patent makes no direct reference to a compression format. Thus, decompression is only an element of the conversion in this claim if "a signal format appropriate for the mobile terminal" would inherently be a compressed format, and "a high definition digital format" would inherently be an uncompressed format. Both parties agree that, given the bandwidth limitations of a cellular network, the "signal format appropriate for the mobile terminal" of the video signal which was "sent from the wireless network communication" would be a compressed format. Mem. in Supp. of Samsung's Mot. for Summ. J. ("Mem. in Supp.") at 15, ECF No. 144 (undisputed fact 60, which VIS does not dispute); Memo in Opp. at 17, ECF No. 163.

VIS presents the declaration of their expert, Arthur T. Brody, as evidence in support of the inference that the "high definition digital format" must be uncompressed. However, the declaration of Mr. Brody only refers to what would be required for the video signal output described in the Palin reference to be displayed on a television. See Memo in Opp., Ex. A at ¶ 14, ECF No 159. Additionally, with respect to data transmissions generally, Mr. Brody's expert report states the increased data requirements for transmission of high definition signals and

describes the corresponding need for those signals to be compressed in order to be transmitted at the rate of Megabit-per-second rather than Gigabit-per-second. Mem. in Opp., Ex. A-2 at ¶ 28, ECF. No. 163. Furthermore, Mr. Brody's declaration suggests that decompression of a signal can take place after it has been transmitted to an alternative display terminal such as a television. Mem. in Opp., Ex. A at ¶ 14, ECF No. 163. Therefore, if a high definition signal can be, and preferably is, transmitted in a compressed format and the compressed signal can be decompressed for display at the alternative display terminal, decompression is not necessary prior to transmission to the alternative display terminal. VIS's evidence thus argues against their assertion of decompression as a required limitation of the conversion element of this claim.

The Court notes that claim construction is a matter of law, and even if VIS's arguments presented an issue of fact, it would not prevent the Court from rendering a decision on the meaning of the claim language. Markman, 52 F.3d at 979. Here, the claim language and specification, as well as the evidence presented as to what a person having ordinary skill in the art would have understood from the specification and claim language, support the finding that decompression is not a limitation required by the language of claim 21 of the '268 patent.

4. '381 Patent, Claims 19 and 33

The '381 patent's independent claims, claims 19 and 33, use the following language with regard to the processing element:

"wherein the processing . . . includes converting a signal format appropriate for the mobile terminal to a different format for output to the alternative display terminal, such that the converted video signal produced by the conversion device comprises a high definition television (HDTV) digital signal for output to the alternative display terminal."

'381 patent, 9:49-56 & 10:52-48. The only difference between the language used in claims 19 and 33 of the '381 patent and claim 21 of the '268 patent is that the '381 patent's claims use the term "high definition television (HDTV) digital signal" in place of "high definition digital signal." The insertion of the word "television" does not change the fact that while it may be transmitted as either a compressed or uncompressed signal, the increased data involved in a high definition video signal of any kind makes transmission as a compressed signal easier than transmission as an uncompressed signal. Mem. in Opp., Ex. A-2 at ¶ 28, ECF. No. 163. Therefore, the same analysis as used with respect to the '268 patent's language applies. Furthermore, as there are no other differences in claim language between claims 19 and 33 of the '381 patent and claim 21 of the '268 patent, the analysis of the '268 patent's claim applies to the '381 patent's claims in its entirety. Thus, decompression is not a required element of the '381 patent's claim 19, claim

33, or their dependent claims.

In summary, decompression is a limitation required by the claim language of only the '492 and '711 patents' asserted claims. While the language covering the conversion element in the asserted claims of the '268 and '381 patents might, under a liberal interpretation, encompass decompression, it is not a required element of the conversion step. As such, in considering the validity or invalidity of the asserted claims of the '268 and '381 patents, decompression during conversion of the video signal is not a limitation which must be disclosed in the prior art in order to render the asserted claims of the '268 and '381 patents invalid as anticipated or obvious.

ii. Anticipation

Samsung asserts that U.S. Patent No. 7,580,005 ("Palin") addressed the same "problem" identified by VIS's '492 patent family and the same "solution" to that problem well before the priority date of the '492 patent family. Mem. in Supp. at 17, ECF No. 144. Samsung asserts that Palin thus anticipates the '492 patent family and renders the '492, '711, '268, and '381 patents invalid. Id.

"A patent is invalid for anticipation if a single prior art reference discloses each and every limitation of the claimed invention." Schering Corp., 339 F.3d at 1377. VIS argues in their brief in opposition that Palin fails to anticipate the

asserted claims of the '492 patent family because Palin does not disclose the conversion element or the decompression step of conversion required by all the asserted claims. Mem. in Opp. at 15-16, ECF No. 163. Under the claim constructions stated above however, decompression is only required by the asserted claims of the '492 and '711 patents, not by the asserted claims of the '268 and '381 patents.

VIS further argues with respect to the asserted dependent claims that Palin fails to disclose the external power source limitation of some of those claims (the '492 patent's claim 26, the '711 patent's claim 18, and the '381 patent's claim 22), and that Palin fails to disclose HDMI as required by other dependent claims (the '268 patent's claim 27 and all asserted claims of the '381 patent). The Court will address those disputed issues in the following order; Palin's disclosure of conversion of the video signal and failure to disclose decompression of the video signal during conversion, Palin's failure to disclose an external power source, and Palin's failure to disclose HDMI.

1. Palin's Disclosure of Conversion and Failure to Disclose Decompression

VIS asserts that Palin fails to disclose decompression or conversion of the video signal as Palin describes a file transfer system. Mem. in Opp. at 18, ECF No. 163. Both parties agree that the mobile device in Palin receives a compressed

video signal. Id.; Rebuttal Br. at 7, ECF No. 168. However, VIS asserts that Palin is directed to splitting data packets, wherein the received compressed file is split into portions, of which one of those portions is sent on to a television without any modification of the original compressed file.

Samsung argues in rebuttal that, other than the opinion of its expert, Mr. Brody, VIS fails to provide support for its argument that the "high quality graphics signal" described in Palin must be a compressed video signal. However, it is noted that, while VIS does rely on the opinion of its expert to support this assertion, the burden remains on Samsung to prove the invalidity of the asserted claims by clear and convincing evidence. i4i Ltd. P'ship, 131 S. Ct. at 2246.

The conversion element of the asserted claims requires at a minimum "only a change to the video signal identified at the beginning of the claim." Markman Opinion at 42, ECF No. 196. In construing the term "converted video signal" in its Markman Opinion, the Court determined that the conversion of the video signal did not require a change to the underlying video content. Markman Opinion at 39-42. In reviewing Palin, it is clear that Palin teaches the splitting of the received video signal data packets into two categories-data for display on the first display, the mobile terminal, and data for display on the second display, the television. Palin also teaches teaching

reformatting of the data to be displayed on the second display.

Declaration of Dr. Kevin C. Almeroth ("Almeroth Dec."), Ex. Q at Abstract, ECF No. 136. However, because a "converted video signal" as construed by this Court in its Markman Opinion does not require a change to the underlying video content, the fact that Palin's processing step does not change the content of the video signal is irrelevant to the issue of whether it teaches the claimed conversion process to produce a "converted video signal."

The '492 patent family's independent claims all require a conversion of the video signal to produce a "converted video signal." In all the asserted claims, this requires a conversion from a "format appropriate for the mobile terminal" to a "format [for/for output to] the alternative terminal," which is different from the original "format appropriate for the mobile terminal." '492 patent, 10:17-24; '711 patent, 9:45-10:6; '268 patent, 10:18-25; '381 patent, 9:49-56 & 10:52-48. Palin receives a video signal in a compressed format as data packet(s), which format is appropriate for the mobile terminal. Almeroth Dec., Ex. Q at 2:25-29 & 2:37-38, ECF No. 136. That the data received in Palin is in a format appropriate for the mobile terminal is further evidenced by the mobile terminal's ability to process and/or display the received data packets. Id. at 2:54-57 & 3:3-13.

Palin also discloses that the converted video signal be formatted for the second, or alternative, display terminal. Id. at 2:39-41 ("the image on the second display device is viewed as taking into consideration the different display capabilities of the second display device."). Thus, Palin discloses the limitations that the converted video signal comprises the format, display and power level, for the alternative display terminal. Palin further discloses a display format for output to the alternative display terminal. Id. at 2:54-57 ("The image data received by the mobile terminal comprises data to be ultimately reassembled into an image to be displayed on a display. . . on another device."). Therefore, Palin discloses conversion of a video signal from a format appropriate for the mobile terminal to a format appropriate for the alternative display terminal, including display format and power levels. As this is the only dispute as to whether Palin discloses or teaches the limitations of claims 21, 22, 25, 28, or 29 of the '268 patent, those claims are invalid as anticipated by Palin. Therefore, the Court grants summary judgment as to the invalidity of claims 21, 22, 25, 28, or 29 of the '268 patent.

However, with regard to the '492 and '711 patents' conversion element, the Court has already stated that it includes the additional limitation of decompression. Because the conversion element as recited in the asserted claims takes

place at the mobile terminal, the decompression of the video signal as a required limitation of the conversion of the video signal must similarly take place at the mobile terminal. Thus, in order to anticipate every limitation of the asserted claims of the '492 and '711 patents, Palin must also disclose decompression of the video signal at the mobile terminal.

VIS asserts that Palin fails to discuss compression or display formats and that the Bluetooth connection used in Palin to transmit data to the television would be incapable of supporting the transmission of uncompressed video. Mem. in Opp. at 19, ECF No. 163. VIS further asserts that Samsung has previously conceded, in one of Samsung's own prior patent applications, that Bluetooth was not a suitable technology for relaying video. *Id.* In rebuttal, Samsung argues that VIS' assertion regarding the inability to use a Bluetooth connection to output a video signal in display format is belied by the '492 specification, which discloses the use of a Bluetooth connection for that purpose. Rebuttal Br. at 7, ECF No. 168. The '492 specification lists a Bluetooth connection as a possible method of transmitting the video signal. '492 patent at 4:11-16 (where specification states that "[a] wireless connection [between the external display and the mobile terminal] may also be provided, although it may currently be less practical to provide than the wired connection because of the potential for high throughput

rate requirements" and that wireless connection "may also implement any conventional known technology including but not limited to a Bluetooth connection."). However, as already discussed above, decompression is not an inherently necessary step in the conversion element in all the asserted claims, let alone all the embodiments described in the '492 specification. Furthermore, VIS has rebutted Samsung's argument with evidence that, due to the constraints of the bandwidth available through a Bluetooth connection, it would not be feasible to transmit an uncompressed video signal via a Bluetooth connection. Mem. in Opp., Ex. A at ¶ 12-13, ECF No. 159.

While Palin makes no reference to compression explicitly, Palin may still anticipate the claims if decompression is "inherent" in its disclosure. In re Robertson, 169 F.3d at 745. Furthermore, "inherent anticipation does not require that a person of ordinary skill in the art at the time would have recognized the inherent disclosure." Schering Corp., 339 F.3d at 1377. The Court concludes that Palin does inherently contemplate decompression as a step in its process as the video must ultimately return to an uncompressed format in order to be displayed on the second display terminal. Mem. in Opp., Ex. A at ¶ 14, ECF No. 159. However due to the constraints of Bluetooth connections as already discussed, that decompression must take place after the video is transmitted in a compressed

format via a Bluetooth connection to the television. In the asserted claims of the '492 and '711 patents, however, the decompression occurs during conversion at the mobile terminal, prior to transmission of the video signal to the alternative display terminal. Thus, while Palin does inherently disclose decompression, it does not disclose decompression as an element of the conversion of the video signal at the mobile terminal.

The Court concludes that Palin does not teach decompression at the mobile terminal prior to sending the signal to the television, as is required by the asserted claims of the '492 and '711 patents. As this is the only claim element of the asserted independent claims not disclosed by Palin, we will return to address this limitation in the obviousness analysis to determine if, as Samsung asserts, Palin in combination with other prior art renders decompression obvious.

2. Palin's Failure to Disclose an External Power Source

VIS asserts that Palin fails to anticipate the '492 patent's claim 26, the '711 patent's claim 18, and the '381 patent's claim 22, because Palin fails to disclose the use of an external power source to support the video signal conversion. Mem. in Opp. at 19-20, ECF No. 163. Samsung asserts that even if Palin does not disclose an external power source it was obvious that an external power source could be used as of the July 17, 2004 priority date because every mobile terminal's

battery is charged by plugging the mobile terminal into an external power source. Rebuttal Br. at 10-11, ECF No. 168. However, VIS argues that plugging a mobile terminal into an external power source as Samsung describes results in charging the battery, and any power used by the mobile terminal would first flow through the battery, the internal power source. Mem. In Opp. at 20-21, ECF No. 163.

The language used in these dependent claims with regard to the external power source limitation is identical. The language of claim 22 contemplates an external power source separate from the recharging process in a mobile terminal because claim 22 states that the power used is from a "source that differs from the internal power supply of the mobile terminal." '381 patent at 9:66-10:4. These dependent claims teach that the conversion module receives power for the conversion from an external power source, which is separate from the internal power source-i.e. the battery.

The charging of a mobile terminal's battery involves the provision of power from an external power source to the internal power source. Such method of recharging does not teach obtaining power from a source separate from the internal power source as required by the language of the claims. Thus, the Court finds VIS's argument persuasive and summary judgment is denied as to claim 26 of the '492 patent, claim 18 of the '711

patent, and claim 22 of the '381 patent.

3. Palin's Failure to Disclose HDMI

VIS asserts that Palin fails to anticipate claim 27 of the '268 patent and the asserted claims 19-33 of the '381 patent, because Palin fails to disclose HDMI as a method of transmitting the converted video signal to the alternative display terminal. Samsung asserts that even if Palin doesn't disclose HDMI as a method of transmitting the converted video signal, using HDMI would have been obvious as of the July 17, 2004 priority date for the '268 and '381 patents, and that a person having skill in the art would have known about HDMI and been motivated to combine HDMI with Palin.

VIS does not dispute that a person having skill in the art would know about HDMI as of the priority date. However, VIS argues that a person having ordinary skill in the art would have no motivation to combine Palin with HDMI because Palin teaches sending a compressed signal and HDMI is an uncompressed format.

HDMI is a method by which a video signal in an uncompressed format can be transmitted between devices via a wireline between the first and second devices. Almeroth Dec. at ¶ 34, ECF No. 136; Mem. in Opp., Ex. A-2 at ¶ 37-38, ECF No. 159. Palin is directed to the transmission of a video signal from a mobile terminal to a second display terminal. VIS argues that Palin teaches sending a compressed signal, because the method of

transmission disclosed in Palin is a Bluetooth connection, which is incapable of supporting the transmission of uncompressed video. Mem. in Opp. at 18 & Ex. A at ¶ 9-14, ECF No. 159. Thus, the substitution of HDMI in place of Bluetooth in Palin would then imply a switch from the transmission of compressed video signals to the transmission of uncompressed video signals. This switch would require decompression of the original video signal received by the mobile terminal to take place at the mobile terminal in order to facilitate transmission of an uncompressed video signal via HDMI from the mobile terminal to the second display terminal. Thus, the combination would require a reworking of the system taught by Palin. Nevertheless, both HDMI and Palin are directed to facilitating the transmission of video signals between devices.

VIS also argues that due to the size requirements for HDMI and the size limitations of mobile terminals, especially as of the priority date, it would not have been obvious to combine Palin with HDMI. Thus, in order for the combination of Palin and HDMI to have been obvious, a person having ordinary skill in the art would have to have been motivated to combine a system which transmits a compressed video signal with a method for transmitting an uncompressed video signal—thereby necessitating incorporation of decompression of the video signal into the processing of the video signal—as well as to combine the fairly

bulky output port required for HDMI with a relatively small electronic device. The Court concludes that whether the combination of Palin and HDMI would have been obvious to a person having ordinary skill in the art is a close call. Due to the standard at summary judgment, which requires that the evidence be viewed in favor of the nonmovant, VIS, and the clear and convincing evidence of invalidity burden of proof borne by Samsung, summary judgment is denied on this limitation. Samsung has failed to meet its burden of proof and as such, the Court denies summary judgment of invalidity with regard to claim 27 of the '268 patent and all the asserted claims of the '381 patent.

iii. Obviousness

In addition to asserting anticipation of the '492, '268, '711, and '381 patents through the Palin reference, Samsung alternatively asserts that the Digital Living Network Alliance's publication "Home Networked Device Interoperability Guidelines v1.0," (hereinafter "DLNAv1.0"), in combination with Palin, renders obvious any claims not already anticipated by Palin alone. Mem. in Supp., 26, ECF No. 144. Samsung additionally included U.S. Patent No. 8,028,093 ("Karaoguz") in the combination of references rendering the '492 patent family obvious. However, Karaoguz was included to support Samsung's argument of invalidity should the Court adopt in its Markman Opinion Samsung's proposed construction of the term "converted

video signal".⁹ Id. Thus, as the Court did not adopt Samsung's proposed construction, the parties' arguments regarding Karaoguz are no longer relevant and the Court will not address them.

To establish a *prima facie* case of obviousness, the burden is on the alleged infringer to establish, by clear and convincing evidence, that a skilled artisan would have both been motivated to combine the prior art and have a reasonable expectation of success in doing so. Kinetic Concepts, Inc., 688 F.3d at 1360. The Graham factors which, as discussed above, inform the obviousness analysis are as follows: "(1) the scope and content of the prior art, (2) the differences between the prior art and the claims at issue, (3) the level of ordinary skill in the art, and (4) any relevant secondary considerations, such as commercial success, long felt but unsolved needs, and the failure of others." Wyers v. Master Lock Co., 616 F.3d at 1237 (citing Graham, 383 U.S. at 17-18). As the Court must consider all four of the Graham factors in its obviousness analysis, In re Cyclobenzaprine, 676 F.3d at 1076-77, the Court will structure its analysis accordingly. "The determination of invalidity for reasons of obviousness under 35 U.S.C. § 103 is a legal conclusion based on underlying facts" with the Graham

⁹ The construction of "converted video signal" proposed by Samsung was "a video signal where the underlying video content has been changed to be appropriate for display on the alternative display." Markman Opinion at 38, ECF. No. 198.

factors being "factual considerations that underlie the obviousness inquiry." Galderma Laboratories v. Tolmar, 13-1034, slip opinion at *6 (Fed. Cir. December 11, 2013) (citing Graham, 383 U.S. at 17-18). At summary judgment, therefore, a determination regarding obviousness may only lie if there are no genuine disputes of material fact with regard to the Graham factors. Anderson, 477 U.S. at 248.

The third Graham factor is uncontested and the experts for each party appear to have come to an agreement regarding the level of ordinary skill in the art. Consideration of the second Graham factor suggests that, should DLNAv1.0 be valid as a prior art reference to the '492 and '711 patents, the prior art would likely render at least the asserted independent claims of those patents obvious. Furthermore, based on the evidence currently presented, the fourth Graham factor, secondary considerations, would not likely succeed in rebutting the prima facie case of obviousness should DLNAv1.0 be valid prior art. As discussed below, however, consideration of the first Graham factor reveals that there are genuine disputes of material fact as to DLNAv1.0's status as prior art to the '492 patent family. These genuine disputes of material fact are sufficient to preclude the Court from finding that Samsung has demonstrated a prima facie case of obviousness.

1. The First Graham Factor

The first Graham factor involves the scope and content of the prior art. Here, the parties dispute both whether DLNAv1.0 qualifies as prior art and what is taught by DLNAv1.0. The first issue the Court must address therefore is whether DLNAv1.0 qualifies as a printed publication within the meaning of 35 U.S.C. § 102.

"Printed publications" have been classified as prior art references which can invalidate a patent under 35 USC §§ 102 (a) and (b). The courts have interpreted the statutory phrase "printed publication" consistently within § 102 with the only difference between sections (a) and (b) being the timing of the publication. See, Cooper Cameron Corp. v. Kvaerner Oilfield Products, Inc., 291 F.3d 1317, 1324 (Fed. Cir. 2002); Application of Foster, 343 F.2d 980, 986 (C.C.P.A. 1965) ("[W]hen a reference fully discloses in every detail the subject matter of a claim, the statutory basis of a rejection on that reference is 35 U.S.C. § 102(a) if the reference date is before the applicant's date of invention, thereby establishing want of novelty, and section 102(b) if the reference date is more than one year prior to the actual United States filing date, thereby establishing a so-called 'statutory bar,' more accurately, a one-year time-bar which results in loss of right to a patent, regardless of when the invention was made.").

"The statutory phrase 'printed publication' has been interpreted to mean that before the critical date the reference must have been sufficiently accessible to the public interested in the art; dissemination and public accessibility are the keys to the legal determination whether a prior art reference was 'published.'" In re Klopfenstein, 380 F.3d 1345, 1348 (Fed. Cir. 2004) (quoting In re Cronyn, 890 F.2d 1158, 1160 (Fed. Cir. 1989)). "A document is publicly accessible if it 'has been disseminated or otherwise made available to the extent that persons interested and ordinarily skilled in the subject matter or art, exercising reasonable diligence, can locate it and recognize and comprehend therefrom the essentials of the claimed invention without need of further research or experimentation.'" Cordis Corp. v. Boston Scientific Corp., 561 F.3d 1319, 1333 (Fed. Cir. 2009) (quoting In re Wyer, 655 F.2d 221, 226 (CCPA 1981)). In its analysis of the case law concerning printed publications as prior art references within the meaning of 35 U.S.C. § 102, the Federal Circuit has stated that:

throughout our case law, public accessibility has been the criterion by which a prior art reference will be judged for the purposes of § 102(b). Oftentimes courts have found it helpful to rely on distribution and indexing as proxies for public accessibility. But when they have done so, it has not been to the exclusion of all other measures of public accessibility.

In re Klopfenstein, 380 F.3d at 1350. "The determination of whether a reference is a 'printed publication' under 35 U.S.C. §

102(b) involves a case-by-case inquiry into the facts and circumstances surrounding the reference's disclosure to members of the public." In re Klopfenstein, 380 F.3d at 1350 (citing In re Cronyn, 890 F.2d at 1161 and In re Hall, 781 F.2d at 899).

Due to the presumption of validity of an issued patent, the burden of proof remains with Samsung to show by clear and convincing evidence that DLNAv1.0 is a valid prior art reference which functions to invalidate the patent. i4i Ltd. P'ship, 131 S. Ct. at 2246. Samsung has offered evidence showing that DLNAv1.0 was published June 22, 2004, before the '492 patent family's priority date of July 16, 2004. Mem. in Supp. at 26, ECF No. 144; Berliner Declaration, Ex. V at 69:5-70:25 & 152:13-155:16, ECF No. 146. Samsung has offered the sworn testimony of DLNA's Marketing Manager, Katherine Gengler, showing that, at the very least, DLNAv1.0 was available to members of the publishing organization as of June 22, 2004. Berliner Declaration, Ex. V at 70:11-25, ECF No. 146. VIS has presented evidence that the cost of membership in DLNA was a \$10,000 fee as of July 19, 2013, the date of Ms. Gengler's deposition. Mem. in Opp., Ex. D-3 at 104:18-23, ECF No. 159. These facts are undisputed by VIS and Samsung.

Notwithstanding this information, Samsung has offered no evidence showing how or at what price DLNAv1.0 would have been available to non-members of the interested public. The sworn

testimony of DLNA's Marketing Manager, Katherine Gengler, states merely that posting a document on an external website and making it available for sale was DLNA's common method of publication. Berliner Declaration, Ex. V at 70:11-17, ECF No. 146. Furthermore, she does not know what price DLNAv1.0 would have been sold at, had it been posted for sale via the website. Id.

Samsung appears to argue, in the alternate, that DLNA's membership consists of a significant portion of the interested public, and, as such, that DLNAv1.0 was sufficiently accessible to the interested public. See Cooper Cameron Corp., 291 F.3d at 1324 ("on remand the district court should take into consideration that reports need only be accessible to the interested public, Mass. Inst. of Tech. v. AB Fortia, 774 F.2d 1104, 1109, 227 USPQ 428, 432 (Fed. Cir. 1985), which in this case may be the very entities who had access to the documents: SISL joint venture members, participants, and their contractors and licensees."). However, in Cooper Cameron Corp. there was evidence that the information was not maintained in a state of confidentiality and much of the information was available without restriction--issues which the district court in that case was instructed to consider on remand. Id.; see also, Kyocera Wireless Corp. v. Int'l Trade Comm'n, 545 F.3d 1340, 1351 (Fed. Cir. 2008) (where the court found the documents, which "were visible to any member of the interested public without

requesting them from an ETSI member," to be publicly available, especially as "ETSI did not impose restrictions on ETSI members to prevent them from disseminating information about the standard to non-members.").

Here, VIS has put forward evidence that distribution of this document, DLNAv1.0, was restricted and that it was known that non-public documents on DLNA's "Kavi website" could only be shared among member companies. Almeroth Dec., Ex. R, DLNAv1.0, at 1, ECF No. 145 ("Do Not Copy" "Copyright 2004. . . Any form of reproduction and/or distribution of these works is strictly prohibited."); Mem. in Opp., Ex. D-3, Deposition of Katherine Gengler, at 142:3-143:7, ECF No. 159. Samsung argues that a marking of "confidential" on a document has no effect on public accessibility where distribution of the documents to the interested public occurred or was intended. However, Samsung merely presents evidence that DLNA intended for the DLNAv1.0 guidelines to be adopted by the industry and fails to provide evidence of distribution outside the members of the publishing organization.

Samsung additionally asserts that the press releases regarding DLNAv1.0 show that interested persons would have been aware of the availability of DLNAv1.0. Rebuttal Br. at 12, ECF No. 168. However, the standard for a printed publication is not public awareness of a document, but public accessibility of the

document. In re Klopfenstein, 380 F.3d at 1348. Furthermore, Samsung's contention, that VIS has failed to produce evidence that access was denied to any who sought it, fails as it is Samsung, and not VIS, who bears the burden of proof in this instance.

Public accessibility is present where a document is "made available to the extent that persons interested and ordinarily skilled in the subject matter or art, exercising reasonable diligence, can locate it and recognize and comprehend therefrom the essentials of the claimed invention without need of further research or experimentation." Cordis Corp., 561 F.3d at 1333 (quoting In re Wyer, 655 F.2d at 226). Availability only at the cost of a \$10,000 membership fee is likely to render the document effectively inaccessible to the general members of the interested public.¹⁰ Furthermore, genuine issues of material fact remain as to whether the document, DLNAv1.0, was available to non-members and, if it was available, at what price it would have been accessible.

¹⁰ As the parties' experts agree on the level of ordinary skill in the art, the Court is using that definition to determine who would constitute members of the interested public. The parties' experts agree that those possessing "an accredited bachelor's degree in computer science, electrical engineering, or a related discipline that included coverage of video technologies and familiarity with wireless communications, and also at least two years of industry experience" would meet the level of ordinary skill in the art. Almeroth Dec., at ¶ 30, ECF No. 136; Mem. in Opp., Ex. A at ¶ 2, ECF No. 159. The experts also agree that industry experience could substitute for formal education and Dr. Almeroth puts forth the idea that additional graduate experience could substitute for industry experience. Id.

Due to the genuine issues of material fact regarding accessibility, summary judgment is not available on the issue of whether DLNAv1.0 qualifies as a printed publication under 35 U.S.C. §102(a). Anderson, 477 U.S. at 248. The factual dispute regarding the price one could pay to obtain access to DLNAv1.0, as well as the subsequent determination of whether that price would effectively render the document insufficiently accessible to the pertinent public, are issues for the finder of fact. However, it is clear that the only price point presented by the parties-\$10,000 as of July 17, 2013-is too high to consider the document accessible to the interested public. This is particularly so when one considers that Samsung bears the burden of proving invalidity by "clear and convincing" evidence.

Having determined that there are genuine issues of material fact which prevent the Court from determining at the summary judgment stage whether DLNAv1.0 is a valid prior art reference to the '492 patent family, the Court cannot grant summary judgment based on the other three factors. However, because the Court is required to consider all four of the Graham factors in its obviousness analysis, In re Cyclobenzaprine, 676 F.3d at 1076-77, in order to provide a complete analysis to the parties and any appellate court, the Court will briefly address the other three Graham factors.

2. The Second Graham Factor

The second Graham factor involves the comparison of the differences between the prior art and the claims at issue to determine if the prior art would be capable of rendering the claims at issue obvious. As the Court has already concluded above that Palin teaches all the limitations required by the asserted claims of the '492 and '711 patents except decompression at the mobile terminal prior to sending the signal to the television, the Court will here address whether DLNAv1.0 would cure Palin's deficiency and render the asserted claims of the '492 and '711 patents obvious.

DLNAv1.0 defines a set of mandatory and optional media format profiles to enable electronic devices to send and receive media content between them so that the media content can be enjoyed on all the devices. Mem. in Supp., Ex. R at DLNA_SAM003715-16. DLNAv1.0 incorporates MPEG-4, a video compression format using the MPEG codec, into the mandatory media format support requirements set forth by DLNAv1.0 Table 7-4. Id. at DLNA_SAM0003785-86. In doing so, DLNAv1.0 states that "by default support MPEG-4 encoding of captured video content, but either convert to a mandatory DLNA AV media format profile to on-demand streamlining to DLNA devices or else allow the user to change the content capture encoding to a mandatory

DLNA AV media format profile."¹¹ Id. at DLNA_SAM003786. This language suggests that in supporting the MPEG codec's form of encoding, the media format support requirements mandate that the device be capable of decoding the media, i.e. decompressing it, and then re-encoding it. In combination with Palin, which discloses the other elements of the independent claims of the '492 and '711 patent, the provision by DLNAv1.0 of a mandatory media format support requirement for the device, which would require decompression of the video signal as part of re-encoding it to a mandatory DLNA AV format prior to sending it to the home devices, would cover the scope of the claims in their entirety. The Court observes, without deciding, that, should DLNAv1.0 be a valid printed publication within the meaning of 35 U.S.C. § 102, the jury is likely to conclude that the combination of DLNAv1.0 and Palin appears to render the asserted independent claims of the '492 and '711 patents obvious.

Additionally, regarding the motive to combine DLNAv1.0 with Palin, the fact that Palin taught provision of video from a mobile terminal to a television would give a person having skill in the art incentive to look for an industry standard for the

¹¹ The Court interprets the above quote to mean the following: the media format support requirements require DLNA supported devices to, by default, support MPEG-4 encoding of captured video content and in so doing either convert it to a mandatory DLNA AV media format profile with on-demand stream-lining to DLNA devices or allow the user to change the MPEG-4 encoding to a mandatory DLNA AV media format profile.

formatting of the video and media format support requirements for transmission of media content, specifically video, between devices. As DLNAv1.0 was developed by many of the major companies in those areas of technology, mobile terminals and televisions, a person having ordinary skill in the art would likely have been motivated to use the standards proposed by those companies.

3. The Third Graham Factor

The third Graham factor, the level of ordinary skill in the art, is largely uncontested among the parties. The expert for Samsung, Dr. Kevin Almeroth, in his report, purports to adopt the level of ordinary skill in the art proposed by VIS's expert, Arthur T. Brody, in his report. The parties' experts agree that those possessing "an accredited bachelor's degree in computer science, electrical engineering, or a related discipline that included coverage of video technologies and familiarity with wireless communications, and also at least two years of industry experience" would meet the level of ordinary skill in the art. Almeroth Dec. at ¶ 30, ECF No. 136; Mem. in Opp., Ex. A at ¶ 2, ECF No. 159. The experts also agree that industry experience could substitute for formal education or specific academic training. Id. As those elements of the definition of the level of ordinary skill in the art listed above appear to be agreed upon by the parties, the Court will adopt them for the purposes

of this opinion.

Dr. Almeroth additionally puts forth the proposition that additional graduate experience could substitute for the two years of industry experience. Almeroth Dec. at ¶ 30, ECF No. 136. As VIS does not contest this suggestion and it mirrors the agreed upon substitution of experience for education, the Court will also adopt that proposition into the definition of the level of ordinary skill in the art for the purposes of this opinion.

4. The Fourth Graham Factor

"In Graham the Supreme Court explained that the public and commercial response to an invention is a factor to be considered in determining obviousness, and is entitled to fair weight." Arkie Lures, Inc. v. Gene Larew Tackle, Inc., 119 F.3d 953, 957 (Fed. Cir. 1997). (citing Graham, 383 U.S. at 35-36). "The so-called 'secondary considerations' provide evidence of how the patented device is viewed by the interested public: not the inventor, but persons concerned with the product in the objective arena of the marketplace." Id. "This objective evidence of nonobviousness includes copying, long felt but unsolved need, failure of others, commercial success, unexpected results created by the claimed invention, unexpected properties of the claimed invention, licenses showing industry respect for the invention, and skepticism of skilled artisans before the

invention." In re Rouffet, 149 F.3d 1350, 1355 (Fed. Cir. 1998) (internal citations omitted).

VIS presents evidence on the secondary considerations of commercial success, copying, and long-felt need and asserts that these secondary indicia of nonobviousness outweigh any obviousness claim. Mem. in Opp. at 31, ECF No. 163. The evidence presented by VIS in support of these asserted secondary considerations are the commercial success of Samsung's accused products, which it alleges were copied from VIS's patents, and Samsung's efforts to solve the problem addressed by the patents-in-suit. Id. at 31-33. Samsung argues that these secondary considerations are inadequate because of VIS' failure to establish a nexus between the indicia and a purportedly nonobvious feature of VIS' invention. Rebuttal Br. at 21, ECF No. 168.

a. Commercial Success

A nexus must exist between the commercial success and the claimed invention in order for the evidence of commercial success to be relevant or significant to the obviousness analysis. Tokai Corp., 632 F.3d at 1369 (citing Ormco Corp. v. Align Tech., Inc., 463 F.3d 1299, 1311-12 (Fed. Cir. 2006)). "If commercial success is due to an element in the prior art, no nexus exists." Id. VIS has proffered no evidence showing a nexus between the commercial success of the accused products and

the nonobvious invention contained in their patents. VIS instead cites to Brown & Williamson Tobacco Corp. v. Philip Morris Inc., 229 F.3d 1120, 1130 (Fed. Cir. 2000), for the presumption that: "if the marketed product embodies the claimed features, and is coextensive with them, then a nexus is presumed and the burden shifts to the party asserting obviousness to present evidence to rebut the presumed nexus." Mem. in Opp. at 30-31, ECF No. 163.

Samsung seeks to rebut this presumption by arguing that the nexus cannot be presumed as VIS has failed to show that "the marketed product . . . is coextensive with [the claimed features]." Rebuttal Br. at 23, ECF No. 168 (citing to Brown & Williamson Tobacco Corp., 229 F.3d at 1130). In order to show commercial success, it is not enough for VIS to show evidence that the accused products have been successful and that the accused products include the claimed invention.¹² "When the thing that is commercially successful is not coextensive with the patented invention—for example, if the patented invention is only a component of a commercially successful machine or

¹² "When a patentee asserts that commercial success supports its contention of nonobviousness, there must of course be a sufficient relationship between the commercial success and the patented invention. The term 'nexus' is often used, in this context, to designate a legally and factually sufficient connection between the proven success and the patented invention, such that the objective evidence should be considered in the determination of nonobviousness. The burden of proof as to this connection or nexus resides with the patentee." Demaco Corp. v. F. Von Langsdorff Licensing Ltd., 851 F.2d 1387, 1392 (Fed. Cir. 1988).

process—the patentee must show *prima facie* a legally sufficient relationship between that which is patented and that which is sold.” Demaco Corp., 851 F.2d at 1392 (emphasis added). VIS attempts to do so by producing internal documents from Samsung in which roughly one quarter of Samsung consumers in 2012 connected their tablets or smartphones to their televisions more than twice a week. Mem. in Opp. at 32, Ex. 5 at SAMV0031528, Ex. 6 at SAMV00408793, ECF No. 163. At summary judgment, viewing the evidence in a light most favorable to VIS, this is sufficient to show a nexus between the commercial success of the accused products and the claimed invention.

b. Long-felt Need

The evidence presented by VIS, showing that the ‘492 patent has been referenced by several other patent applications and that Samsung filed an application describing the same need eight months after VIS’s initial filing, fails to show long felt need. The numerous citations to the ‘492 patent as a reference in other patent applications only shows that the field is advancing and there is work being done that is related to the ‘492 patent. The patent application filed by Samsung describing the same problem was only filed eight months after VIS’ initial filing, which is hardly a period of time in which the need can be considered to have become “long felt.” Moreover, a filing eight months after the filing of the ‘492 patent fails to show that

the '492 patent filled a need that existed prior to the filing of the '492 patent.

c. Copying

Regarding VIS' assertion of copying, copying is only a secondary indicia of nonobviousness where the "evidence of efforts to replicate a specific product" have been proffered in conjunction with evidence of substantial similarity to the patented product. Wyers v. Master Lock Co., 616 F.3d at 1246 ("Not every competing product that arguably falls within the scope of a patent is evidence of copying; otherwise, 'every infringement suit would automatically confirm the nonobviousness of the patent.' Iron Grip Barbell Co. v. USA Sports, Inc., 392 F.3d 1317, 1325 (Fed. Cir. 2004)."). VIS asserts that because Samsung had a patent application rejected in light of the publication of the '492 patent's application before the accused products were launched, it should be inferred that the accused products were copied from this publication. Mem. in Opp at 34, ECF No. 163. This assertion is insufficient to support the assertion of copying because VIS has failed to produce evidence of a specific patented product which Samsung has copied. As such, copying also fails as a secondary consideration supporting nonobviousness.

The only secondary consideration for which there is sufficient supporting evidence, even viewing all the evidence in

the light most favorable to VIS, is commercial success. Although commercial success can be a strong indicia of nonobviousness, based on only the evidence presented at the summary judgment stage it would likely fail to rebut the obviousness claim. However, the fourth Graham factor, secondary considerations, is only relevant if DLNAv1.0 is valid prior art, which the Court cannot determine at this time due to genuine issues of material fact. The Court therefore denies Defendants' motion for summary judgment on the asserted claims of the '492 and '711 patents as obvious in light of Palin and DLNAv1.0.

B. Invalidity of the '398 Patent

Due to its status as a continuation of the '733 patent, which is a continuation-in-part of the '492 patent, the '398 patent contains additional material and is generally entitled to the later priority date of the filing of the continuation-in-part, e.g. the filing date of the '733 patent where the additional material was added, May 22, 2007. As such, a greater pool of prior art is available with regard to the '398 patent than is available with regard to the '492 patent family.

Samsung claims that the earliest priority date that the asserted claims of the '398 patent, claims 15, 58, 60, 61, 62, and 63,¹³ are entitled to is March 22, 2007. Mem. in Supp. at

¹³ Claim 57 is not addressed here due to counsel's representation at the hearing on the instant motion for summary judgment that claim 57

29-30, ECF No. 144. Thus, Samsung claims that all of those claims are anticipated or rendered obvious by the "DLNA Home Networked Device Interoperability Guidelines expanded: October 2006" (hereinafter "DLNAv1.5"), which was publicly available as of October 2006. Id. However, VIS argues that DLNAv1.5 is not prior art to the asserted claims of the '398 patent because those claims are entitled to claim priority back to as early as September 22, 2004, and at least back to the date on which the '492 patent's specification included Figure 3, June 24, 2005. Transcript of Mot. for Summ. J. Hearing at 50:12-51:24, ECF No. 396.

While VIS argues that the asserted claims of the '398 patent were conceived as of September 22, 2004, the Court need not determine at this time whether VIS is entitled to claim priority based on conception because priority based on the June 24, 2005 filing of the '492 patent will suffice to pre-date the asserted prior art reference-DLNAv1.5. As the figure used to assert conception as of September 22, 2004, VIS002975, is the same figure that appears in the '492 patent as Figure 3, there is no disparity in the content to be analyzed to determine priority. Additionally, the filing of the '492 patent functions as constructive reduction to practice for which further

was no longer being asserted as infringed. Transcript of Mot. for Summ. J. Hearing at 50:14-17, ECF No. 396.

corroboration beyond proof of filing is not necessary. Solvay S.A. v. Honeywell Int'l, Inc., 622 F.3d 1367, 1376 (Fed. Cir. 2010); Medichem, S.A. v. Rolabo, S.L., 437 F.3d 1157, 1169 (Fed. Cir. 2006). Thus, as the priority date of the '492 patent will suffice to pre-date DLNAv1.5 as a prior art reference, and the filing of the '492 patent suffices as proof of reduction to practice, there is no need to examine whether evidence of sufficient corroboration has been presented for VIS to successfully claim conception as of September 22, 2004.

i. Priority Date

"Under 35 U.S.C. § 120, 'a claim in a later application receives the benefit of the filing date of an earlier application so long as the disclosure in the earlier application meets the requirements of 35 U.S.C. § 112, ¶ 1, including the written description requirement, with respect to that claim.'" Cordance Corp., 658 F.3d at 1334 (quoting Tech. Licensing Corp., 545 F.3d at 1326). "While the earlier application need not describe the claimed subject matter in precisely the same terms as found in the claims at issue, the prior application must 'convey with reasonable clarity to those skilled in the art that, as of the filing date sought, [the inventor] was in possession of the invention.'" Tech. Licensing Corp., 545 F.3d at 1331-32 (emphasis in original) (internal citations omitted).

"[O]nce a challenger (the alleged infringer) has introduced sufficient evidence to put at issue whether there is prior art alleged to anticipate the claims being asserted, prior art that is dated earlier than the apparent effective date of the asserted patent claim, the patentee has the burden of going forward with evidence and argument to the contrary." Tech. Licensing Corp., 545 F.3d at 1329. "[H]owever much the burden of going forward may jump from one party to another as the issues in the case are raised and developed," this does not shift Samsung's ultimate burden of proof to show by clear and convincing evidence that the patent is invalid. Id.

With regard to the asserted independent claim, claim 15, the only claim limitations on which VIS' assertion of priority is specifically disputed by Samsung is "establishing a predetermined channel operatively in communication with the destination device, and transporting the multimedia content to the destination device via said predetermined channel, for the destination device to display the multimedia content item in conjunction with a navigational command to the destination device for the predetermined channel." Mem. in Supp. at 29-30, ECF No. 144; Rebuttal Br. at 19-20, ECF No. 168. Samsung has presented evidence in the form of the testimony of Dr. Almeroth, supported by citations to VIS' patents and the prosecution history of those patents, that there is no support for this

limitation in any specification prior to that filed with the '733 patent. Almeroth Dec. at ¶ 23-29, ECF No. 136.

The evidence presented by Samsung is asserted to show that when the above limitation was added to the claims, the support cited to for the addition of this limitation was column 26, lines 41-55 of the '733 specification, which describe the process depicted in Figure 17 of the '733 specification. Id. at ¶ 26-28. The language of column 26, lines 41:55 of the '733 specification is not present in the '492 specification and neither is the figure to which it refers.

However, VIS asserts that sufficient support for this limitation can be found in Figure 3 of the '492 specification. Transcript of Mot. for Summ. J. Hearing at 51:1-23, ECF No. 396. The claim construction for the term "establishing a predetermined channel" was determined by this Court to be "specifying a communication pathway." Markman Opinion at 73, ECF No. 198. Based on this broad construction of the term "establishing a predetermined channel," this Court construed the term "in conjunction with a navigational command to the destination device for the predetermined channel" to mean "in conjunction with a command to the destination device to select the communication pathway." Id. at 76. In construing these claim terms, the Court found the '733 specification's description of various "communication channel[s]," such as USB,

TV cable, Ethernet, Bluetooth, WLAN, Satellite, DSL, etc., instructive.¹⁴ Id. at 65. Based on this understanding of the terms within this limitation, the Court will now examine VIS' assertion that Figure 3 of the '492 specification provides sufficient support, within the meaning of 35 U.S.C. § 112, ¶ 1, for claim 15 of the '398 patent to claim priority back to the date at which the Figure was included in the '492 specification.

The relevant portion of Figure 3 of the '492 specification depicts a converted video signal being sent from a video encoder to a display terminal via a selection of communication pathways. '492 patent at Fig. 3. The communication pathways depicted in Figure 3 are DVI, DVI-D, HDMI, IEEE 1394, S-video, RGBHV, RGBS, and EIA7703. Id. These connections are communications pathways contemplated within the definition of "communication channel" used by the '398 specification.

It is inherent that, in order for the converted video signal to be sent from the mobile terminal along a specific

¹⁴ "Although the '733 specification's use of the term 'predetermined channel' does little to elucidate the proper construction of this term, the Court finds its related descriptions of various 'communication channel[s]' to be instructive. Specifically, the '733 specification describes 'communication channels between the MC System and the various local user terminals,' such as:

(1) direct connection[s] using the available transmission port/standard such as USB, RS232, TV cable, Ethernet, Telephone line, etc.; (2) Wireless Personal Area Network[s] such as UWB, Bluetooth, WLAN, etc.; (3) Long-range wireless connections such as WiMax, Satellite, e.g., VSAT, TV broadcast, etc.' or (4) Wire-line connection such as DSL, Cable, Ethernet, etc.

'733 patent at 25:13-29." Markman Opinion at 65, ECF No. 198.

communication pathway, there must be something which specifies the communication channel. In specifying a communication channel, it is also inherent that communication with the destination device must occur for transmission over the communication channel to take place. Additionally, it would be known by a person having skill in the art that executable program code stored in a memory could perform "specifying a communication channel." Thus, Figure 3 of the '492 specification reasonably conveys that the inventor was in possession of the limitations "establishing a predetermined channel operatively in communication with the destination device, and transporting the multimedia content to the destination device via said predetermined channel, for the destination device to display the multimedia content item" of claim 15 of the '398 patent at the time that Figure 3 was included in the filing of the '492 patent, June 24, 2005. Tech. Licensing Corp., 545 F.3d at 1329.

However, there is no support within Figure 3 or the associated description in the '492 specification for sending the converted video "in conjunction with a command to the destination device to select the communication pathway." See, '492 patent at Fig. 3 & 6:26-60. The first paragraph of 35 U.S.C. § 112 requires that:

[t]he specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same, and shall set forth the best mode contemplated by the inventor of carrying out his invention

"[T]he test for sufficiency of support in a parent application is whether the disclosure of the application relied upon reasonably conveys to the artisan that the inventor had possession at that time of the later claimed subject matter."

Vas-Cath Inc. v. Mahurkar, 935 F.2d 1555, 1563 (Fed. Cir. 1991)

(internal citations omitted). There is no depiction of an action occurring at the display terminal in Figure 3 beyond the display terminal's receipt of the converted "multimedia data stream." Thus, there is no support for a requirement that the display terminal also select the communication channel at the same time as the mobile terminal is selecting the communication channel and sending the converted signal via the communication channel. Consequently, there is no support for a command to instruct the display terminal to do so. Therefore, Figure 3 of the '492 specification does not reasonably convey that the inventor was in possession of the limitation "in conjunction with a navigational command to the destination device for the predetermined channel" of claim 15 of the '398 patent at the time that Figure 3 was included in the filing of the '492

patent, June 24, 2005. Tech. Licensing Corp., 545 F.3d at 1329. Claim 15 of the '398 patent, and all associated dependent claims, thus are not entitled to claim priority back to June 24, 2005.¹⁵ The applicable priority date for the asserted claims of the '398 patent remains March 22, 2007, the filing date of the '733 patent, and DLNAv1.5 remains valid prior art.

ii. Anticipation

"A patent is invalid for anticipation if a single prior art reference discloses each and every limitation of the claimed invention." Schering Corp., 339 F.3d at 1377. Samsung asserts that DLNAv1.5 anticipates claims 15, 60, 61, 62, and 63 of the '398 patent. VIS does not dispute DLNAv1.5's anticipation of claims 15, 60, 61, and 62 other than the above discussed assertion of entitlement to an earlier priority date. As the Court has already concluded that DLNAv1.5 is prior art to the '398 patent, with no other disputes as to anticipation, the Court determines that claims 15, 60, 61, and 62 of the '398 patent are invalid as anticipated by DLNAv1.5.

iii. Obviousness

In addition to anticipation by DLNAv1.5, Samsung asserts that DLNAv1.5 in combination with Rakib renders obvious any

¹⁵ As VIS indicates that the claim of conception as of September 22, 2004 would be based on a diagram on which Figure 3 of the '492 patent was based, it is unlikely that 35 U.S.C. § 122, ¶ 1 would be satisfied by that diagram either.

asserted claims of the '398 patent not already anticipated by DLNAv1.5 alone. Mem. in Supp., 26, ECF No. 144. The only claims not already anticipated by DLNAv1.5 alone are claims 58 and 63 of the '398 patent.

Again, the Graham factors that inform the obviousness analysis are as follows: "(1) the scope and content of the prior art, (2) the differences between the prior art and the claims at issue, (3) the level of ordinary skill in the art, and (4) any relevant secondary considerations, such as commercial success, long felt but unsolved needs, and the failure of others." Wyers v. Master Lock Co., 616 F.3d at 1237 (citing Graham, 383 U.S. at 17-18). As discussed above, the parties do not appear to dispute the level of ordinary skill in the art, and the third Graham factor is therefore uncontested. Additionally, as the secondary considerations remain the same for both the '398 patent as for the '492 patent family, the discussion of the fourth Graham factor set forth above is equally applicable to the '398 patent. Thus, only the first and second Graham factors will be discussed below with regard to the '398 patent.

The availability of Rakib as a prior art reference for the asserted claims is not disputed and the dispute with regard to DLNAv1.5 as a prior art reference has been resolved above. The only dispute raised by VIS as to claims 58 and 63 is whether the combination of HDMI with DLNAv1.5 would have been obvious to a

person having ordinary skill in the art. Samsung does not argue that Rakib discloses the transmission of uncompressed data or that the addition of HDMI to Rakib would be obvious, thus, examination of Rakib is unnecessary.

As stated above, VIS asserts that DLNAv1.5 does not disclose HDMI and, contrary to Samsung's assertions, that it would not have been obvious to a person having ordinary skill in the art to combine DLNAv1.5 with HDMI. Mem. in Opp. at 29, ECF No. 163. VIS asserts that, like Palin, DLNAv1.5 is used to transmit compressed data, while HDMI is used to transmit uncompressed data. Id. In support, VIS cites to the Brody Declaration, which states in conclusory fashion that DLNA supports the transmission of compressed data. Id. at 29 & Ex. A at ¶ 31. However, Samsung asserts that DLNAv1.5 discloses guidelines for connecting consumer electronics on a home network, not a type of compression format, device interface, or transmission protocol. Rebuttal Br. at 20-21, ECF No. 168. Samsung further asserts that DLNAv1.5's provision for "Digital Media Player functions to 'play the content locally on the DMP' makes implicit decompression of the MPEG-formatted video files specified by DLNAv1.5." Id. at 21. Whether this provision in DLNAv1.5 is sufficient to make implicit a decompression of the video files prior to transmission, as required for use of HDMI as a method of transmission, is at least a genuine dispute of

material fact and thus precludes a grant of summary judgment of invalidity of claim 63 of the '398 patent.

With regard to the HDMI limitation, both parties make the same assertions and arguments for claim 58 of the '398 patent as they did with respect to claim 63 of the '398 patent. As such, the same analysis applies with regard to claim 58 of the '398 patent. Therefore, summary judgment of invalidity of claims 58 and 63 of the '398 patent is denied due to the existence of a genuine dispute of material fact.

C. Willful Infringement

Establishing willful infringement, which permits recovery of enhanced damages, requires a patentee to make a showing of "objective recklessness." In re Seagate Tech., LLC, 497 F.3d at 1371. To satisfy such standard, a patentee must demonstrate "by clear and convincing evidence that the infringer acted despite an objectively high likelihood that its actions constituted infringement of a valid patent." Id. "The state of mind of the accused infringer is not relevant to this [threshold] objective inquiry." Id. Only if it is determined that such objective standard is met must the subjective knowledge inquiry be examined. Id.

Although summary judgment requires that the evidence be viewed in a light most favorable to the nonmovant, in this case Plaintiff, this does not shift the burden of proof. Apple

Computer, Inc., 234 F.3d at 20. Thus, on willful infringement at the summary judgment stage, the burden remains on Plaintiff to establish by clear and convincing evidence that Defendants willfully infringed the asserted patents. As noted above, the Federal Circuit has "established the rule that generally the 'objective prong of Seagate tends not to be met where an accused infringer relies on a reasonable defense to a charge of infringement.'" Bard Peripheral Vascular, Inc., 682 F.3d 1003, 1005-06 (Fed. Cir. 2012) cert. denied, 133 S. Ct. 932 (2013) (quoting Spine Solutions, Inc., 620 F.3d at 1319).

Samsung submits that there are no genuine issues of material fact with regard to whether Samsung relies on a good faith invalidity argument, which reliance causes the objective prong of Seagate to not be met. Mem. in Supp. at 36, ECF No. 144. Samsung contends that the Court should therefore grant summary judgment on this issue and dismiss the willful infringement claim. Id. In opposing Samsung's motion for summary judgment, VIS focuses on Samsung's subjective knowledge of the patents-in-suit. Mem. in Opp. at 35, ECF No. 163. VIS asserts that there is a genuine issue of material fact as a jury could reasonably conclude from the undisputed facts, together with Exhibits 11 and 20, and the Brody Declaration, that Samsung had knowledge of the patents-in-suit. Id. at 35-37. However, the subjective knowledge inquiry—an alleged infringer's

subjective knowledge of the patents-in-suit—is only reached once a showing has been made that meets the objective recklessness standard. In re Seagate, 497 F.3d at 1371. Indeed, the Federal Circuit has expressly stated that where “the court determine[s] that the infringer’s reliance on a defense was not objectively reckless, it cannot send the question of willfulness to the jury, since proving the objective prong is a predicate to consideration of the subjective prong.” Powell v. Home Depot U.S.A., Inc., 663 F.3d 1221, 1236 (Fed. Cir. 2011) (citing DePuy Spine, Inc. v. Medtronic Sofamar Danek, Inc., 567 F.3d 1314, 1335-37 (Fed. Cir. 2009)) (emphasis added).

The threshold determination of objective recklessness "entails an objective assessment of potential defenses based on the risk presented by the patent." Bard Peripheral Vascular, Inc., 682 F.3d at 1006. Thus, the question is "whether a defense or noninfringement theory was 'reasonable.'" Id. (citing Powell, 663 F.3d at 1236). Moreover, a mere assertion of an invalidity defense will not necessarily negate a claim of willful infringement. See i4i Ltd. P'ship v. Microsoft Corp., 598 F.3d 831, 860 (Fed. Cir. 2010) aff'd, 131 S. Ct. 2238 (U.S. 2011).

When a defense or noninfringement theory asserted by an infringer is purely legal (e.g., claim construction), the objective recklessness of such a theory is a purely legal question to be determined by the judge. See Powell, 663 F.3d at 1236. When the

objective prong turns on fact questions, as related, for example, to anticipation, or on legal questions dependent on the underlying facts, as related, for example, to questions of obviousness, the judge remains the final arbiter of whether the defense was reasonable, even when the underlying fact question is sent to a jury. See Powell, 663 F.3d at 1236-37; DePuy Spine, Inc. v. Medtronic Sofamor Danek, Inc., 567 F.3d 1314, 1324 (Fed. Cir. 2009) (explaining that ensnarement has underlying factual issues but is ultimately a question of law for the judge that is "to be determined by the court, either on a pretrial motion for partial summary judgment or on a motion for judgment as a matter of law at the close of the evidence and after the jury verdict" (quoting Warner-Jenkinson Co., Inc. v. Hilton Davis Chem. Co., 520 U.S. 17, 39 n. 8, 117 S. Ct. 1040, 137 L. Ed. 2d 146 (1997))).

Bard Peripheral Vascular, Inc., 682 F.3d at 1007.

In this case, Samsung asserts invalidity based on anticipation and obviousness. As demonstrated by the analysis above, Samsung's defense of patent invalidity is a reasonable one. The Federal Circuit has already recognized that, where there is a genuine issue of material fact which prevents a decision at the summary judgment stage and the factual question is a close one on which the jury could reasonably find for either party, the defense of invalidity is a reasonable one. See DePuy Spine, Inc., 567 F.3d at 1337 (where the court held that "[w]hile the fact that an issue was submitted to a jury does not automatically immunize an accused infringer from a finding of willful infringement," where the record, viewed objectively, indisputably shows that the question submitted was

one that required "an intensely factual inquiry," the fact that the jury ultimately found in favor of the patentee on the issue does not diminish the difficulty of the jury's task or the reasonableness of the defense. (citing Vehicular Tech. Corp. v. Titan Wheel Int'l, Inc., 212 F.3d 1377, 1381 (Fed. Cir. 2000)). If a defense, which was ultimately rejected by the jury, can nevertheless be considered reasonable due to the intensely factual inquiry involved in ruling on the defense, then Samsung's defense, which has been granted in part at the summary judgment stage, must be reasonable. Therefore, based on the analysis above, the defenses asserted by Samsung are objectively reasonable and an objectively high likelihood of infringement is not found under In re Seagate's first prong.

Furthermore, despite VIS' assertions to the contrary, an alleged infringer is not required to show contemplation of defenses to a potential infringement action before pursuit of the allegedly infringing activities. Specifically, the Federal Circuit in In re Seagate, in overruling Underwater Devices Inc. v. Morrison-Knudsen Co., Inc., 717 F.2d 1380, 1389 (Fed. Cir. 1983), eliminated the affirmative duty of care from the context of willful infringement. Prior to In re Seagate, the standard set forth in Underwater Devices required that where "a potential infringer has actual notice of another's patent rights, he has an affirmative duty to exercise due care to determine whether or

not he is infringing." Underwater Devices Inc., 717 F.2d at 1389 (Fed. Cir. 1983), overruled by In re Seagate Tech., LLC, 497 F.3d 1360 (Fed. Cir. 2007). The Federal Circuit stated that "[b]ecause we abandon the affirmative duty of due care, we also reemphasize that there is no affirmative obligation to obtain opinion of counsel." In re Seagate Tech., LLC, 497 F.3d at 1371. Requiring that, in order to have a "reasonable" defense, a potential infringer formulate the defense before taking any action that might potentially infringe the patent, would essentially impose an affirmative obligation to obtain the opinion of counsel—a proposition rejected by the Federal Circuit's opinion in In re Seagate. Such an interpretation would also conflate the subjective knowledge inquiry of the second prong of In re Seagate with the objective recklessness standard of the first prong. Therefore, since there is no affirmative obligation to obtain the opinion of counsel, Id., there is no requirement that an accused infringer prove that formulation of their defense occurred prior to the allegedly infringing actions, or even prior to the filing of the infringement suit.

V. CONCLUSION

For the reasons stated above, Defendants' summary judgment motion is hereby **GRANTED, in part, and DENIED, in part.** ECF No. 134.

Defendants' motion is GRANTED as to the invalidity of claims 21, 22, 25, 28, and 29 of the '268 patent as anticipated by U.S. Patent No. 7,850,005 ("Palin"). Defendants' motion is GRANTED as to claims 15, 60, 61 and 62 of the '398 patent as anticipated by "DLNA Home Networked Device Interoperability Guidelines expanded: October 2006" (hereinafter "DLNAv1.5").

Defendants' motion is DENIED as to invalidity of claim 27 of the '268 patent. Defendants' motion is DENIED as to invalidity of all asserted claims of the '492 patent. Defendant's motion is DENIED as to invalidity of all asserted claims of the '711 patent. Defendants' motion is DENIED as to invalidity of all asserted claims of the '381 patent. Defendants' motion is DENIED as to invalidity of claims 58 and 63 of the '398 patent.

Defendants' motion is GRANTED as to a finding of no willful infringement.

The Clerk is DIRECTED to send a copy of this Opinion and Order to all counsel of record.

IT IS SO ORDERED.

(s) MSD

Mark S. Davis
UNITED STATES DISTRICT JUDGE

Norfolk, Virginia
January 8, 2014

UNITED STATES DISTRICT COURT
EASTERN DISTRICT OF VIRGINIA
Norfolk Division

VIRGINIA INNOVATION
SCIENCES, INC.,

Plaintiff,
v.
Case No.: 2:13cv332

SAMSUNG ELECTRONICS CO.,
LTD., ET AL.,

Defendants.

OPINION AND ORDER

This matter is before the Court on a motion for partial summary judgment filed by Samsung Electronics Co., Ltd., Samsung Electronics America, Inc., and Samsung Telecommunications America, LLC (collectively "Samsung" or "Defendants"). ECF No. 85. Defendants move for partial summary judgment on three issues: 1) "that Samsung's MHL-enabled smartphones and tablets do not directly infringe any of the claims of [the patents-in-suit] asserted by VIS under 35 U.S.C. § 271(a)," 2) that the accused products do not contributorily infringe under § 271(c), and 3) "that [induced infringement] damages under § 271(b), if any, must be limited to the number of accused intermediate devices sold." Mot. for Partial Summ. J. 1, ECF No. 85. The motion has been fully briefed and is therefore ripe for decision.

After examination of the briefs and the record, the Court determines that a hearing is unnecessary, as the facts and legal arguments are adequately presented, and the decisional process would not be aided significantly by oral argument. See Fed. R. Civ. P. 78(b); E.D. Va. Loc. Civ. R. 7(J). For the reasons that follow, the Court **GRANTS**, in part, and **DENIES**, in part Defendants' Motion for Partial Summary Judgment. ECF No. 85.

I. FACTUAL AND PROCEDURAL BACKGROUND

At issue in this case are five¹ patents: U.S. Patent No. 7,899,492 ("the '492 patent"), U.S. Patent No. 8,050,711 ("the '711 patent"), U.S. Patent No. 8,145,268 ("the '268 patent"), U.S. Patent No. 8,224,381 ("the '381 patent"), and U.S. Patent No. 8,135,398 ("the '398 patent"). All of the patents-in-suit are continuations or continuations-in-part of the '492 patent, which in turn issued from U.S. Patent Application No. 11/165,341 ("the '341 application"), filed June 24, 2005. The '711, '268, and '381 patents are continuations from the '492 patent and, thus, all share a substantively identical specification ("the '492 specification"). The '711, '268, and '381 patents as continuations of the '492 patent also claim priority directly to the '492 patent, which ultimately claims priority to provisional application number 60/588,359, filed on July 16, 2004.

¹ Previously, there were seven patents at issue in this case. However, U.S. Patent Nos. 7,957,733 ("the '733 patent") and 8,417,290 ("the '290 patent") are no longer asserted as infringed. Agreed Dismissal Order, ECF No. 67.

U.S. Patent No. 7,957,733 ("the '733 patent"), which is not at issue in this case, was filed on May 22, 2007 as a continuation-in-part of the '492 patent. The '398 patent is a continuation from the '733 patent. The shared specification of the '733 and '398 patents ("the '398 specification") includes all of the '492 specification along with additional material. Each of the patents-in-suit describes inventions intended to resolve the inconvenience and impracticability of viewing multimedia content on the small screens of mobile terminals.

In the instant patent infringement action, plaintiff Virginia Innovation Sciences, Inc. (hereinafter "Plaintiff" or "VIS") alleges that Defendants have directly, indirectly, and willfully infringed the patents-in-suit by making, using, offering for sale, selling, and/or importing a wide range of accused products, including smartphones, tablets, Blue-ray players, and hubs. Pl.'s First Am. Compl., ECF No. 47. Samsung denies VIS's claims of infringement and asserts several affirmative defenses, including invalidity or unenforceability of all patents-in-suit, prosecution history estoppel and other equitable doctrines. Additionally, Samsung asserts counterclaims seeking declarations of non-infringement, invalidity, and unenforceability for each of the patents-in-suit.

The Court held its Markman hearing in Virginia Innovation Sciences, Inc. v. Samsung Electronics Co., Ltd., et al., Case No. 2:12cv548 (hereinafter "VIS I"), on June 11, 2013 and issued its Markman opinion on September 25, 2013. Case No. 2:12cv548, ECF No. 198. By Order of October 25, 2013, the Court joined for trial this matter, (hereinafter "VIS II"), and VIS I as the matters involve the same parties and patents-in-suit. ECF No. 53. The trial of the two matters is now set for April 21, 2014.

On November 15, 2013, the Court ruled on Defendants' Motion to Dismiss VIS's Claim for Willful Infringement in VIS I; granting, in part, and denying, in part such motion. Case No. 2:12cv548, ECF No. 395. The Court found that the claim for willful infringement failed to state a plausible claim for relief with regard to willful infringement of the '711, '268, and '381 patents. Id. On January 8, 2014, the Court ruled on Defendants' Motion for Summary Judgment in VIS I; granting, in part, and denying, in part, such motion. Case No. 2:12cv548, ECF No. 413. The Court found no willful infringement, and also found claims 21, 22, 25, 28, and 29 of the '268 patent and claims 15, 60, 61 and 62 of the '398 patent invalid as anticipated. As a result of these rulings in VIS I, the parties submitted a Stipulated Entry of Judgment regarding Count VI of Plaintiff's Amended Complaint in VIS II, which alleged willful infringement, requesting entry of judgment in favor of

Defendants. ECF No. 106. On March 6, 2014, the Court issued an Order in VIS II entering judgment in favor of Defendants on Count VI of Plaintiff's Amended Complaint, the willful infringement claim, based on the parties' Stipulated Entry of Judgment. ECF No. 118.

On January 31, 2014, Defendants filed the instant motion in VIS II for partial summary judgment of no infringement. ECF No. 85. The accused products at the center of this motion are collectively termed "MHL-enabled products" and include MHL-enabled smartphones and tablets accused of infringing in the VIS I and VIS II cases, and Defendants seek summary judgment with respect to those covered by both VIS I and VIS II.

The list of MHL-enabled products at issue which are accused of infringing the patents-in-suit in the VIS I case are as follows: Samsung Nexus i515, Samsung Galaxy Note, Samsung Galaxy S II, Samsung Galaxy S II Epic 4G Touch, Samsung Galaxy S III, Samsung Galaxy S II Skyrocket, Samsung Infuse 4G, Samsung Galaxy Tab 8.9 (cellular only), Samsung Galaxy Tab 10.1 (cellular only), Samsung Galaxy 10.1 (Wi-Fi only), Samsung Galaxy 2 10.1 (Wi-Fi only), Samsung Galaxy Nexus i515 Multimedia Dock, Samsung HDMI Smart Adapter, Samsung HDTV Adapter (ETC-EIA2BE), Samsung HDTV Adapter (EPL-3FHUBEG), Samsung Galaxy Tab HDTV Adapter, and AllShare Cast Wireless Hub. Dec. of Brian Berliner, Ex. Q at 1, ECF No. 88-3.

The list of MHL-enabled products at issue which are accused of infringing the patents-in-suit in the VIS II case are as follows: Samsung Galaxy Note III, Samsung Galaxy Victory, Samsung Galaxy Express, Samsung Galaxy S Relay, Samsung Galaxy S4, Samsung Galaxy Note II, Samsung MHL 2.0 HDTV Smart Adapter, and Samsung Smart Dock Multimedia Hub. Dec. of Brian Berliner, Ex. Y, ECF No. 88-11.

The Court first addresses the compliance of the instant motion with the Court's Fed. R. Civ. P. 16(b) Scheduling Order. The Court then recites the applicable standard of review and addresses the substance and merits of Defendants' Motion for Partial Summary Judgment of No Infringement and the associated responses, briefs, and declarations. ECF No. 85, 86, 88, 92, 93, 94, 95, 99, 100, 101, 108, and 109.

II. COMPLIANCE WITH THE 16(b) SCHEDULING ORDER

When the Court joined VIS I and VIS II for trial, which resulted in rescheduling the trial of VIS I for a later date, the Fed. R. Civ. P. 16(b) Scheduling Order specifically advised the parties that the Court reserved the right to deny, as waived, any attempt to reopen discovery or pursue motions regarding issues that could have been raised in VIS I. 16(b) Scheduling Order, ECF No. 63. This was to prevent parties from obtaining the proverbial 'two bites at the apple' with regard to issues raised in VIS I: "[b]ecause the time period for filing

dispositive motions had already passed in VIS I at the time it was joined for trial with VIS II, the Court reserves the right to dismiss as waived any dispositive motion filed in the joined cases that could have been, but was not, timely filed by the dispositive motion deadline in VIS I." 16(b) Scheduling Order 2, ECF No. 63 (emphasis added). Therefore, to the extent that arguments in this motion by Defendants fail to comply with the Court's 16(b) scheduling order, the Court views such arguments to have been waived. Accordingly, the Court will not consider such waived arguments with respect to those products named in VIS I.

III. STANDARD OF REVIEW

The Federal Rules of Civil Procedure provide that a district court shall grant summary judgment in favor of a movant if such party "shows that there is no genuine dispute as to any material fact and the movant is entitled to judgment as a matter of law." Fed. R. Civ. P. 56(a). The mere existence of some alleged factual dispute between the parties "will not defeat an otherwise properly supported motion for summary judgment; the requirement is that there be no genuine issue of material fact." Anderson v. Liberty Lobby Inc., 477 U.S. 242, 247-48 (1986) (defining "genuine" dispute as "if the evidence is such that a reasonable jury could return a verdict for the nonmoving party"). Furthermore, the standard at summary judgment requires

that the evidence be viewed in favor of the nonmovant and that all "justifiable inferences" be drawn in his favor. Anderson, 477 U.S. at 255.

Moreover, because a ruling on summary judgment "necessarily implicates the substantive evidentiary standard of proof that would apply at the trial on the merits[,]" where the preponderance of the evidence standard applies, "[t]he mere existence of a scintilla of evidence in support of the [non-movant]'s position will be insufficient" to overcome a movant's well-founded summary judgment motion. Anderson, 477 U.S. at 252. If a movant has properly advanced evidence supporting entry of summary judgment, the non-moving party may not rest upon the mere allegations of the pleadings, but instead must set forth specific facts in the form of exhibits and sworn statements illustrating a genuine issue for trial.² Celotex Corp. v. Catrett, 477 U.S. 317, 322-24 (1986). At that point, "the judge's function is not himself to weigh the evidence and determine the truth of the matter but to determine whether there is a genuine issue for trial." Anderson, 477 U.S. at 249. In doing so, the judge must construe the facts and all "justifiable inferences" in the light most favorable to the non-moving party,

² "When a motion for summary judgment is properly made and supported, an opposing party may not rely merely on allegations or denials in its own pleading; rather, its response must – by affidavits or as otherwise provided in this rule – set out specific facts showing a genuine issue for trial." Fed. R. Civ. P. 56(e)(2).

and, further, the judge may not make credibility determinations.

Id. at 255; T-Mobile Northeast LLC v. City Council of City of Newport News, Va., 674 F.3d 380, 385 (4th Cir. 2012).

"Credibility determinations, the weighing of the evidence, and the drawing of legitimate inferences from the facts are jury functions, not those of a judge, whether he is ruling on a motion for summary judgment or for a directed verdict."

Anderson, 477 U.S. at 255.

IV. DISCUSSION

In the interest of expediency, the Court will first address those aspects of the current motion which have been rendered moot or which are considered waived under the Court's 16(b) Scheduling Order. As noted above, Samsung requests summary judgment as to three issues of infringement asserted by VIS: 1) direct infringement, 2) indirect contributory infringement, and 3) indirect induced infringement. Samsung's second request seeks summary judgment as to VIS's claims of contributory infringement of the patents-in-suit by the MHL-enabled products. VIS asserts in response that this issue is moot because contributory infringement is no longer asserted. Mem. in Opp. 27, ECF No. 95. Therefore, relying on VIS's representation to the Court that contributory infringement of the patents-in-suit is no longer asserted – at least with regard to the accused MHL-enabled products of VIS II – the Court **DISMISSES as moot**

Samsung's request for summary judgment of no contributory infringement through the use of the MHL-enabled products. ECF No. 85.

Samsung also argues that entry of summary judgment of no willful infringement is mandated by the Court's summary judgment opinion in VIS I. Mem. in Supp. 3 & 26, ECF No. 86. This argument was not properly raised in the motion, Fed. R. Civ. P. 7(b)(1), but in the memorandum of law submitted in support of such motion. However, because Samsung's argument is moot in light of the Court's issuance of the March 16, 2014 agreed Order entering judgment in favor of Defendants on the willful infringement claim, ECF No. 118, the Court need not consider whether the issue was properly raised. Accordingly, to the extent the Court must address such argument, the Court **DISMISSES as moot** Samsung's argument for mandatory imposition of summary judgment of no willful infringement. ECF No. 86.

VIS asserts direct infringement of at least the Samsung Infuse 4G because it is sold in conjunction with a compatible MLH-to-HDMI adapter. Mem. in Opp. 24, ECF No. 95. VIS represents that it is no longer asserting infringement through the Samsung Galaxy S3 in conjunction with the Samsung AllShare Cast Wireless Hub in light of the Court's Summary Judgment Opinion on Validity in VIS I. *Id.* at 17. Samsung asserts that the Supreme Court of the United States' holding in Deepsouth

prevents liability for the sale of the components of a combination invention until the parts are combined into the patented invention. Mem. in Supp. 19-20, ECF No. 86 (citing DeepSouth Packing Co. v. Laitram Corp., 406 U.S. 518, 528 (1972) for the proposition that "a patent on a combination is a patent on the assembled or functioning whole, not on the separate parts."). In other words, Samsung asserts that the Infuse 4G does not directly infringe because the Infuse 4G is not connected to the MHL-to-HDMI adapter when it is sold. Id. at 20. However, as the Samsung Galaxy S3, Samsung Infuse 4G, and Samsung AllShare Cast Wireless Hub are accused products in VIS I, the above arguments are considered waived in accordance with the Court's 16(b) Scheduling Order. Consequently, for failing to comply with the Court's 16(b) scheduling order, the Court **DENIES** Defendants' request for summary judgment of no direct infringement for the sale of components of a combination patented invention. ECF No. 85.

Having addressed those issues which have been rendered moot or are considered waived, the first and third theories of recovery remain: 1) whether the MHL-enabled products accused in VIS II directly infringe the patents-in-suit, and 3) whether liability for indirect induced infringement of the patents-in-suit – based on the use of MHL-enabled products in conjunction with an intermediate device – should be limited to intermediate

devices sold. The Court will first address the arguments as to the direct infringement of the patents-in-suit because those determinations will impact the remaining issue of limitation of infringement liability.

A. Direct Infringement

The allegations of direct infringement of the patents-in-suit by the MHL-enabled products are challenged by Samsung on two grounds, 1) HDMI output, and 2) conversion to a "display format," which divide the patents-in-suit into two groups. The first group is the '268, '381, and '398 patents, as all asserted claims of those patents require HDMI output as a limitation of the claims. The second group consists of the '492, '711, and '268 patents, as all asserted claims of those patents require conversion of the received video signal into a "display format."

1. Direct Infringement of the '268, '381, and '398 Patents

Samsung asserts that, under a theory of literal infringement – which, in their response to interrogatories, VIS had indicated was the only theory of infringement being alleged – the accused MHL-enabled products do not directly infringe the asserted claims of the '268, '381, and '398 patents, all of which require an HDMI output interface. Mem. in Supp. 22, ECF No. 86; Rebuttal Br. 7-8, ECF No. 100. In opposing Samsung's argument, VIS asserted for the first time, in either VIS I or VIS II, a theory of direct infringement under the doctrine of

equivalents. Mem. in Opp. 17-21, ECF No. 95. Samsung in response argues that VIS should be barred from asserting its untimely addition of a doctrine of equivalents argument pursuant to Federal Rules of Civil Procedure 26(e) and 37(c). Rebuttal Br. 7-11, ECF No. 100. Samsung further asserts that VIS's argument that MHL is equivalent to HDMI fails as a matter of law because 1) such application would vitiate the HDMI limitations, and 2) no reasonable fact finder could find MHL and HDMI to be equivalent. Id. at 12-15.

First, the issue of whether to exclude the evidence in VIS's newly supplemented response to the contention interrogatories, alleging direct infringement under the doctrine of equivalents, was not raised until the filing of Samsung's reply. As such, it is not properly raised by the instant motion for partial summary judgment. Fed. R. Civ. P. 7(b)(1). Furthermore, the request to exclude VIS's doctrine of equivalents evidence and argument cannot be appropriately addressed without a response from VIS. However, because trial of this matter is scheduled to start in ten days, the Court will consider the evidence in VIS's newly supplemented response to the contention interrogatories and address the doctrine of equivalents issue after dealing with the literal infringement arguments.

a. Literal Infringement

With regard to the alleged direct literal infringement, Samsung asserts that the accused MHL-enabled products cannot literally infringe the asserted claims of the '268, '381, and '398 patents because none of the accused products output an HDMI signal as required by all asserted claims of these patents. Mem. in Supp. 22, ECF No. 86. VIS fails to dispute Samsung's assertion or assert any facts in support of an argument that the MHL-enabled products accused in VIS II do literally infringe the asserted claims of the '268, '381, or '398 patents. VIS also fails to assert that there is a genuine issue of material fact on this issue. Accordingly, the Court **GRANTS** summary judgment in favor of Samsung, finding that, under a literal infringement theory, the MHL-enabled products accused in VIS II do not directly infringe the asserted claims of the '268, '381, and '398 patents. ECF No. 85.

b. Infringement under the Doctrine of Equivalents

With regard to the allegation of infringement under the doctrine of equivalents, VIS alleges that the MHL-enabled products infringe the asserted claims, which are limited to outputs using HDMI, because MHL is equivalent to HDMI. VIS asserts that MHL and HDMI are equivalent because "[b]oth HDMI and MHL transmit uncompressed content, relying on Transition-Minimized Differential Signaling (TMDS) encoding." Mem. in Opp.

19, ECF No. 95. VIS further asserts that the only relevant difference – that HDMI uses a total of four channels, three data channels and one clock channel, and MHL serializes the HDMI channels into a single data channel – is insubstantial. Id. Samsung argues that not only is this difference substantial, but that because of this difference, MHL operates in a substantially different way than HDMI. Rebuttal Br. 14, ECF No. 100. Additionally, Samsung argues that the doctrine of equivalents cannot be applied as VIS proposes, because application of the doctrine of equivalents would vitiate the asserted claims' limitation to HDMI output. Id. at 12.

The doctrine of equivalents exists as an exception to the main theory of literal infringement for the following reasons:

The language in the patent claims may not capture every nuance of the invention or describe with complete precision the range of its novelty. If patents were always interpreted by their literal terms, their value would be greatly diminished. Unimportant and insubstantial substitutes for certain elements could defeat the patent, and its value to inventors could be destroyed by simple acts of copying.

Festo Corp. v. Shoketsu Kinzoku Kogyo Kabushiki Co., Ltd., 535 U.S. 722, 731 (2002). For these reasons, "[t]he scope of a patent is not limited to its literal terms but instead embraces all equivalents to the claims described." Id. at 732 (citing Winans v. Denmead, 56 U.S. 330, 347 (1854)).

"To find infringement under the doctrine of equivalents, any differences between the claimed invention and the accused product must be insubstantial." Brilliant Instruments, Inc. v. GuideTech, LLC, 707 F.3d 1342, 1346 (Fed. Cir. 2013) (citing Graver Tank & Mfg. Co. v. Linde Air Prods. Co., 339 U.S. 605, 608 (1950)). The Federal Circuit applies two articulations of the test for equivalence, the insubstantial differences test and the function-way-result test, of which one phrasing may be more suitable for a case depending on its particular facts. Voda v. Cordis Corp., 536 F.3d 1311, 1326 (Fed. Cir. 2008) (citing Warner-Jenkinson Co., Inc. v. Hilton Davis Chem. Co., 520 U.S. 17, 40 (1997)). First, "[u]nder the insubstantial differences test, '[a]n element in the accused device is equivalent to a claim limitation if the only differences between the two are insubstantial.'" Id. (quoting Honeywell Int'l Inc. v. Hamilton Sundstrand Corp., 370 F.3d 1131, 1139 (Fed. Cir. 2004)). Second, "under the function-way-result test, an element in the accused device is equivalent to a claim limitation if it 'performs substantially the same function in substantially the same way to obtain substantially the same result.'" Id. (quoting Schoell v. Regal Marine Indus., Inc., 247 F.3d 1202, 1209-10 (Fed. Cir. 2001)). Regardless of which phrasing of the test for equivalence is used, equivalence is a question of fact. Brilliant Instruments, 707 F.3d at 1347 (citing Crown Packaging

Tech., Inc. v. Rexam Beverage Can Co., 559 F.3d 1308, 1312 (Fed. Cir. 2009); Anchor Wall Sys., Inc. v. Rockwood Retaining Walls, Inc., 340 F.3d 1298, 1313 (Fed. Cir. 2003)). "If no reasonable jury could find equivalence, then the court must grant summary judgment of no infringement under the doctrine of equivalents." Brilliant Instruments, 707 F.3d at 1347.

Under either articulation of the doctrine of equivalents, such doctrine may only be asserted as a theory of patent infringement where such argument is not barred by prosecution history estoppel. Warner-Jenkinson, 520 U.S. at 30. "In particular, prosecution history estoppel limits the broad application of the doctrine of equivalents by barring an equivalents argument for subject matter relinquished when a patent claim is narrowed during prosecution." Voda, 536 F.3d at 1324-25 (quotations and citations omitted). However, more appropriate for consideration in this case, the application of the doctrine of equivalents is also limited where it would vitiate the claim element limitation at issue. As recently explained by the Federal Circuit in Deere & Co. v. Bush Hog, LLC, vitiation "is not an exception to the doctrine of equivalents, but instead a legal determination that 'the evidence is such that no reasonable jury could determine two elements to be equivalent.'" Brilliant Instruments, 707 F.3d at 1347 (quoting Deere & Co., 703 F.3d 1349 (Fed. Cir. 2012)). "In

short, saying that a claim element would be vitiated is akin to saying that there is no equivalent to the claim element." Brilliant Instruments, 707 F.3d at 1347. Vitiation of the claim element is a critical consideration, because "[i]t is important to ensure that the application of the doctrine [of equivalents], even as to an individual element, is not allowed such broad play as to effectively eliminate that element in its entirety." Warner-Jenkinson, 520 U.S. 17, 29. Thus, "[w]hile the tests for equivalents and vitiation are coterminous, . . . the identical equivalents and vitiation tests are made by different decision makers." Nystrom v. Trex Co., Inc., 580 F.3d 1281, 1287 (Fed. Cir. 2009). Judges decide vitiation as a question of law, while juries decide equivalents as a question of fact. Id.

i. Vitiation

As vitiation is a question of law to be decided by the judge, the Court will first address Samsung's vitiation-based argument against the application of the doctrine of equivalents to the HDMI limitations of the asserted claims. Specifically, Samsung argues that, in drafting the asserted claims of the '268 and '398 patents, VIS chose to limit the output interface from "a generic 'interface' to one particular type of TMDS interface," and based on this election of just one embodiment, broadening the HDMI interface limitation to mean any TMDS

interface would render the limitation meaningless. Rebuttal Br. 13, ECF No. 100.

The asserted claims of the '268 and '398 patents – claim 27 of the '268 patent and claim 58 of the '398 patent – are dependent claims which add the limitation that the output interface of the independent claim must be an HDMI output interface.³ '268 patent at 10:47-50; '398 patent at 35:8-9. In other words, the asserted claims of the '268 and '398 patents limit the output interface of the independent claims to one specific embodiment of the specification. All asserted claims of the '381 patent depend from independent claim 33 and as such incorporate all the limitations of independent claim 33. Claim 33 specifies that the output interface provides the converted video signal "through a high definition multimedia interface (HDMI)." '381 patent at 10:59-61. This limitation uses nearly identical language to that used in claim 27 of the '268 patent to limit the output interface to the specific embodiment of the HDMI interface. See '268 patent at 10:47-50.

³ In claim 58, this is accomplished by designating that "the predetermined processing category prompts routing to the television through an HDMI input of the television." '398 patent at 35:8-9. For the multimedia content item of the claim to be routed through an HDMI input of the television, it is necessary that it be transmitted to the television using HDMI. As transmission using HDMI requires output from an HDMI interface, an HDMI output interface is required to accomplish "routing to the television through an HDMI input of the television." '398 patent at 35:8-9.

Since equivalence can only be found where changes from the patented claims are insubstantial, the Court must be careful not to vitiate the claim limitations when applying the test for equivalence. "'In determining whether a finding of infringement under the doctrine of equivalents would vitiate a claim limitation, we must consider the totality of the circumstances of each case and determine whether the alleged equivalent can be fairly characterized as an insubstantial change from the claimed subject matter without rendering the pertinent limitation meaningless.'" In re Transaction Holdings Ltd., LLC, 484 F. App'x 469, 475 (Fed. Cir. 2012) cert. denied, 133 S. Ct. 955 (U.S. 2013) (quoting Carnegie Mellon Univ. v. Hoffmann-La Roche Inc., 541 F.3d 1115, 1129 (Fed. Cir. 2008)). The '492 specification – which is shared by the '268 and '381 patents – and the specification of the '398 patent, set forth multiple potential output interface embodiments, including HDMI, DVI, DVI-D, and S-video. '492 specification, Fig. 3; '398 patent, Fig. 11. As recognized by VIS's expert, Dr. Arthur T. Brody, HDMI and DVI are two of several different formats which use TMDS encoding. Mem. in Opp., Ex. 1. at 12, ECF No. 95-1. In drafting these claims, patentee elected to limit the generic output interface to one specific embodiment, HDMI, among the multiple embodiments disclosed. Applying the doctrine of equivalents to find that MHL is equivalent to HDMI would render

meaningless the limitation to HDMI, even under a narrow definition of equivalent as an uncompressed format using TMDS encoding, as it would recapture at least the DVI embodiment.⁴ See Carnegie Mellon Univ., 541 F.3d at 1129 (determining that, because all asserted claims were dependent claims which were narrower in scope because they required *E. coli* as the bacterial source, "a finding that *Taq* is an equivalent of *E. coli* would essentially render the 'bacterial source [is] *E. coli*' claim limitation meaningless, and would thus vitiate that limitation of the claims."). Thus, a finding under the doctrine of equivalents that MHL is equivalent to HDMI would essentially render the HDMI limitation meaningless and would vitiate the limitation. Therefore, the doctrine of equivalents cannot be applied to the asserted claims of the '268, '381, and '398 patents to find MHL equivalent to HDMI. Thus, the Court **GRANTS** partial summary judgment in favor of Samsung because the asserted claims of the '268, '381, and '398 patents are not directly infringed under the doctrine of equivalents by the accused MHL-enabled products of VIS II, due to the doctrine's

⁴ Furthermore, despite the implication of VIS's arguments against prosecution history estoppel, whether VIS chose to limit the claim to that embodiment for independent reasons, to avoid an anticipated rejection, or to overcome a received rejection from the patent examiner is irrelevant. It is irrelevant whether or not prosecution history estoppel applies in this instance to bar the application of the doctrine of equivalents, in light of VIS's choice to limit the claims to one specific embodiment.

inapplicability to the HDMI limitations of the asserted claims.

ECF No. 85.

ii. Equivalence of HDMI and MHL

Additionally, as an alternative ground for the granting of partial summary judgment of no direct infringement, the Court finds that no reasonable fact finder could find MHL and HDMI to be equivalents. VIS argues for the equivalence of MHL and HDMI on the basis that both are methods of transmitting uncompressed data using TMDS encoding for the purpose of providing video to a display. Mem. in Opp. 19, ECF No. 95. VIS further asserts that MHL and HDMI are equivalent based on their similar schematics, e.g. that both require some level of decoding at a "Sink" prior to display. Id. at 11, 13, & 19. Samsung argues in response that there are substantial differences in the way MHL and HDMI function as MHL serializes four data channels into one data channel while HDMI transmits the four data channels in parallel. Rebuttal Br. 14-15, ECF No. 100.

On the facts of this case, the function-way-result test, under which "an element in the accused device is equivalent to a claim limitation if it 'performs substantially the same function in substantially the same way to obtain substantially the same result,'" is the more suitable of the two articulations of the test of equivalence. Voda, 536 F.3d at 1326 (quoting Schoell, 247 F.3d at 1209-10). Applying this test, the Court finds that

while both HDMI and MHL send an uncompressed signal to a display by employing TMDS encoding, there are substantial differences between the two. There are two undisputed differences in the way MHL functions from the way HDMI functions, which the Court finds to be substantial. First, an HDMI interface is significantly larger than the MHL interface. Second, and more substantially, HDMI requires four channels of data, one being a clock channel, with the other three containing the data content, while MHL deconstructs the four channels of HDMI and serializes the data from the four channels into a single channel. Mem. in Opp. 19, ECF No. 95; Rebuttal Br. 14-15, ECF No. 100. Thus, when the MHL signal arrives at the alternative display, the packets of data must be deconstructed and reassembled into the original channels of data before the data can undergo the usual processing and be displayed. Mem. in Opp., Ex. 1. at 19, ECF No. 95-1 (quoting Ex. 5 at 40:12-41:15, ECF No. 95-5). While HDMI must also be decoded by a "Sink" before it can be displayed, MHL must additionally be deconstructed and reassembled into the HDMI channels before the TMDS encoding is decoded. Id. at 14-15, 19. This requirement for the data to be deconstructed before it can be displayed also infers that, just as a compressed signal cannot be displayed without being decoded and reassembled in an uncompressed form,⁵ MHL cannot be displayed

⁵ In its decision as to summary judgment of validity in VIS I, the

without being decoded and reassembled into a display format. See infra Section IV.B. Thus, while MHL performs substantially the same function of sending the converted video signal/multimedia content to an alternative display, it does not perform it in substantially the same way with substantially the same result as HDMI in the asserted claims. For this reason, even drawing all justifiable inferences in VIS's favor, a reasonable fact finder could not find MHL to be an equivalent to HDMI in the output interface limitations of the asserted claims of the '268, 381, and '398 patents.

2. Direct Infringement of the '492, '711 and '268 Patents

With respect to the '492, '711, and '268 patents, Samsung argues that the accused MHL-enabled products do not infringe the asserted claims of these patents as MHL-enabled products do not "convert" within the meaning of these patent claims. Mem. in Supp. 16, ECF No. 86. Specifically, Samsung asserts that the MHL-enabled products do not "convert" to a "display format" as required by the '492, '711, and '268 patents because the MHL-encoded signal is not "ready for use by the alternative display." Id. VIS responds that conversion to a "display format" only requires decompression, which requirement is

Court was persuaded by VIS's argument and evidence that compressed signals could not be in "display format" because the data would need to be reassembled during the decompression process for the video to be displayed. Court's Opinion on Summary Judgment at 20, Case No. 2:12cv548 ECF No. 413.

satisfied by MHL. Mem. in Opp. 8-9, ECF No. 95. VIS further argues that Samsung's interpretation of "display format," which VIS characterizes as requiring that no other decoding be necessary at the display device, would exclude all embodiments in the '492 specification, including HDMI. Id. at 8-10. VIS asserts, based on HDMI as the standard for "display format" that a "display format" as set forth in the '492 specification contemplates additional decoding at the alternative display. Id. at 12. Specifically, because HDMI is clearly set forth in the specification as a display format and, although HDMI transmits uncompressed data, it requires additional decoding at an "HDMI Sink" before the data can be displayed. Id. at 10-11. Thus, VIS argues, MHL, which also facilitates transmission of uncompressed data and similarly requires additional decoding at an "MHL Sink" before the data can be displayed, meets the requirements for a "display format." Id. at 13. In its rebuttal, Samsung asserts that "display format" does not mean that no decoding is needed at all to display a video, but that, based on the Court's Summary Judgment Opinion in VIS I, "display format" relies on whether changes to the format are required at the alternative display. Rebuttal Br. 4, ECF No. 100. Samsung asserts that MHL must be completely rearranged – deconstructed piece by piece – to be displayed. Id. Samsung further asserts that prosecution history estoppel bars an understanding of the

"display format" as only requiring that the format be uncompressed because VIS argued against such understanding three times during prosecution of '492 patent. Id. at 6.

a. Defining "display format"

Both parties look to the Court's findings in its Summary Judgment Opinion on invalidity in VIS I in making their arguments on this issue. Case No. 2:12cv548, ECF No. 413. Samsung asserts that the Court adopted VIS's position that "display format" requires an uncompressed signal ready for use and, in doing so, found that "[w]here the video data must be 'ultimately reassembled' by the television, the asserted claims are not met." Mem. in Supp. 16, ECF No. 86 (emphasis added). VIS asserts the same quote from the Court's Opinion to mean that the Court found that "where video data must be 'ultimately reassembled' by the television, the asserted claims are met." Mem. in Opp. 8, ECF No. 95 (emphasis added). Samsung's interpretation is the more accurate of the two. The Court found that a "display format" must be decompressed because a video in compressed format must be deconstructed and reassembled into an uncompressed format in order to be displayed. Court's Opinion on Summary Judgment 20, Case No. 2:12cv548, ECF No. 413. In reading the specifications of the patents-in-suit and asserted claims, the Court finds that the patents teach that conversion, which may include decompression, must take place at the mobile

terminal prior to the multimedia content/video being sent to the alternative display. In other words, any conversion to a display format, i.e. an uncompressed format, must occur prior to its transmission from the mobile terminal to the alternative display via an output interface. Thus, a format which requires not just decoding, but deconstruction and reassembly after it is received by the alternate display is not a "display format."

Determining what constitutes a "display format" also requires the Court to consider whether VIS disclaimed claim scope with regard to the term "display format." The Court agrees with Samsung's assertion that VIS previously argued, in front of the United States Patent and Trademark Office during prosecution of the '492 patent, on three occasions, against an interpretation of "display format" as merely involving decompression. Dec. of Brian Berliner, Ex. AA at 14, ECF No. 101-1; Dec. of Brian Berliner, Ex. BB at 14-15, ECF No. 101-2; Dec. of Brian Berliner, Ex. CC at 15-16, ECF No. 101-3. Therefore, the Court finds that, due to prosecution history estoppel, VIS is precluded from arguing that "display format" merely requires an uncompressed format. Omega Eng'g, Inc, v. Raytek Corp., 334 F.3d 1314, 1324 (Fed. Cir. 2003) ("where the patentee has unequivocally disavowed a certain meaning to obtain his patent, the doctrine of prosecution disclaimer attaches and narrows the ordinary meaning of the claim congruent with the

scope of the surrender.”).

b. MHL as a “display format”

The Court now addresses whether MHL constitutes a “display format” within the asserted claims of the ‘492, ‘711, and ‘268 patents. VIS uses HDMI as the exemplary “display format” for the purposes of their argument. As the Court is required to draw all justifiable inferences in non-movant VIS’s favor, Anderson, 477 U.S. at 255, because the Court finds this to be a justifiable inference, the Court will adopt HDMI as the exemplary “display format” for the purpose of interpreting such claim limitation.

The Court finds that while both HDMI and MHL send an uncompressed signal to a display by employing TMDS encoding, there are substantial differences between the two. Significantly, it is undisputed that HDMI transmits in parallel four channels of data, one of which is a clock channel, while MHL deconstructs the four channels of HDMI and interleaves the individual pieces of data from the four channels into a single channel. Mem. in Supp. 10-12, ECF No. 86; Mem. in Opp. 5, ECF No. 95. Thus, when the MHL signal arrives at the alternative display, the previously interleaved segments of data must be deconstructed and reassembled into the original four channels of data, and the clock channel must be divided by a factor of three, before the data can be displayed. Mem. in Supp. 18, ECF

No. 86 (citing Dec. of Dr. Almeroth ¶ 27, ECF No. 93). In other words, just as a compressed signal cannot be displayed without being decoded and reassembled into an uncompressed form, MHL transmitted data cannot be displayed without being deconstructed and reassembled into a "display format" similar to an HDMI format. Therefore, like a compressed signal, an MHL signal cannot be considered to be in a "display format." Moreover, while VIS is correct in asserting that HDMI also requires decoding before it can be displayed, this decoding does not require deconstruction and reassembly of the individual pieces of data. Mem. in Opp., Ex. 1 at 14, ECF No. 95-1; Mem. in Opp., Ex. 3 at 14, ECF No. 95-3. Additionally, as both HDMI and MHL use TMDS encoding, just as HDMI must be decoded in order to be displayed, MHL must also be decoded after it has been rearranged into the original four channels. Mem. in Opp., Ex. 4 at 23-24, ECF No. 95-4. For these reasons, the Court concludes that, even drawing all justifiable inferences in VIS's favor, no reasonable jury could find that MHL constitutes a "display format," as HDMI does.

It is undisputed that all the asserted claims of the '492, '711, and '268 patents require conversion of the received video signal "to a display format for the alternative display terminal." Mem. in Supp. 8, ECF No. 86; Mem. in Opp. , ECF No. 95. Thus, because no reasonable jury could find that MHL

constitutes a "display format," no reasonable jury could find that the accused MHL-enabled products of VIS II by themselves convert the received video signal "to a display format for the alternative terminal" as required to infringe the asserted claims of the '492, '711, and '268 patents. Accordingly, the Court **GRANTS** partial summary judgment in favor of Samsung and finds that the accused MHL-enabled products of VIS II do not by themselves directly infringe the asserted claims of the '492, '711, and '268 patents. ECF No. 85.

**B. Limitation of Indirect Infringement Liability to the
Number of Intermediate Devices Sold**

Indirect infringement is asserted through "infringement allegations where the accused MHL-enabled smartphones and tablets operate 'in conjunction with' an intermediate device." Mem. in Supp. 24, ECF No. 86. Samsung argues that, because a showing of indirect infringement "necessarily requires a showing of direct infringement," VIS must limit its damages from these allegations of infringement "'in conjunction with' an intermediate device" to the number of alleged instances of actual infringement. *Id.* at 25 (citing Convolve, Inc. v. Compaq Computer Corp., 527 Fed. App'x 910, 929 (Fed. Cir. 2013)). Samsung asserts that because "the number of alleged instances of infringement is limited to the number of intermediate devices sold," damages are "properly limited to the number of devices

which are shown to infringe," i.e. the number of infringing intermediate devices sold. Id. at 25. Samsung's argument is premised on the absence of a genuine dispute of material fact as to whether the MHL-enabled products do not by themselves directly infringe the patents-in-suit. Id. at 24.

VIS agrees that "damages, including those for direct infringement, must be limited to the number of devices that are shown to infringe." Mem. in Opp. 27, ECF No. 95. VIS qualifies this agreement with the statement that VIS "disagrees that the only instances of direct infringement are those in which an accused smartphone or tablet is used with a compatible intermediate device." Id.

As stated above, the Court has granted summary judgment, finding that the MHL-enabled products of VIS II do not by themselves directly infringe the asserted claims of the patents-in-suit. Therefore, as VIS otherwise agrees with Samsung's position, the Court **GRANTS** summary judgment on this issue, finding that liability for indirect infringement of the patents-in-suit, through the use of accused products "in conjunction with" intermediate devices, must be limited to the number of intermediate devices sold. ECF No. 85.

V. CONCLUSION

For the reasons stated above, Defendants' Motion for Partial Summary Judgment of No Infringement is hereby **GRANTED**,

in part, and DENIED, in part. ECF No. 85.

For its failure to comply with the Court's Scheduling Order, the Court views the Defendants' Motion for Partial Summary Judgment of No Infringement as waived to the extent that it requests relief regarding products accused in VIS I. Accordingly, the Court DENIES Defendants' Motion as to those products accused in VIS I. ECF No. 85.

Relying on VIS's representation to the Court that contributory infringement of the patents-in-suit is no longer asserted – at least with regard to the accused MHL-enabled products of VIS II – the Court DISMISSES as moot Samsung's motion for summary judgment of no contributory infringement through the use of the MHL-enabled products. ECF No. 85.

For failing to comply with the Court's 16(b) scheduling order, the Court DENIES Defendants request for summary judgment of no direct infringement for the sale of components of a combination patented invention. ECF No. 85.

The Court GRANTS summary judgment in favor of Samsung, finding that the accused MHL-enabled products of VIS II do not by themselves directly infringe the asserted claims of the '268, '381, and '398 patents, under either the literal theory of infringement or the doctrine of equivalents. ECF No. 85.

The Court GRANTS summary judgment in favor of Samsung, finding that the accused MHL-enabled products of VIS II do not

by themselves directly infringe the asserted claims of the '492, '711, and '268 patents. ECF No. 85.

The Court **GRANTS** summary judgment in favor of Samsung, finding that liability for indirect infringement of the patents-in-suit, through the use of accused products "in conjunction with" intermediate devices, must be limited to the number of intermediate devices sold. ECF No. 85.

The Clerk is **DIRECTED** to send a copy of this Opinion and Order to all counsel of record.

IT IS SO ORDERED.

/s/ 

Mark S. Davis
UNITED STATES DISTRICT JUDGE

Norfolk, Virginia
April 11, 2014

UNITED STATES DISTRICT COURT
EASTERN DISTRICT OF VIRGINIA
Norfolk Division

**VIRGINIA INNOVATION
SCIENCES, INC.**

Plaintiff,

v.

Case No.: 2:12cv548

SAMSUNG ELECTRONICS CO.,
LTD., ET AL.,

Defendants.

ORDER

This matter is before the Court on Motion in Limine #11 filed by Samsung Electronics Co., Ltd., Samsung Electronics America, Inc., and Samsung Telecommunications America, LLC (collectively "Samsung" or "Defendants"). Mot. in Lim. #11, ECF No. 443 (Case No. 2:12cv548), ECF No. 149 (Case No. 2:13cv332). Samsung moves to bar Virginia Innovation Sciences, Inc. (hereinafter "VIS" or "Plaintiff") from "arguing or presenting evidence that Samsung's MHL-enabled smartphones directly infringe the asserted claims of U.S. Patent Nos. 8,145,268 ("the '268 Patent"), 8,224,381 ("the '381 Patent) and 8,135,398 ("the '398 Patent")" under the doctrine of equivalents, pursuant to Federal Rules of Civil Procedure 26 and 37. Mem. in Supp. 1, ECF No. 444 (Case No. 2:12cv548), ECF No. 150 (Case No. 2:13cv332).

I. STANDARD OF REVIEW

Federal Rule of Civil Procedure 37(c) provides, in relevant part, that "[i]f a party fails to provide information . . . as required by Rule 26(a) or (e), the party is not allowed to use that information [] to supply evidence on a motion, at a hearing, or at a trial, unless the failure was substantially justified or is harmless." Fed. R. Civ. P. 37(c)(1). As the United States Court of Appeals for the Fourth Circuit has held, "and as the language of Rule 37(c)(1) evidences, the Federal Rules impose an 'automatic sanction' of exclusion of a party's [evidence] for failure to adhere to" the requirements set forth in Rule 26. Campbell v. United States, 470 F. App'x 153, 156 (4th Cir. 2012); see also Southern States Rack And Fixture, Inc. v. Sherwin-Williams Co., 318 F.3d 592, 592 n.2 (4th Cir. 2003) ("The Rule 37(c) advisory committee notes emphasize that the automatic sanction of exclusion provides a strong inducement for disclosure of material that the disclosing party would expect to use as evidence.") (internal quotation marks and citation omitted). Thus, the relevant inquiry is whether Plaintiff failed to provide required information under Rule 26(e) and, if so, whether that failure was substantially justified or harmless.

The provision of Federal Rule of Civil Procedure 26 governing the supplementation of interrogatories states the following:

(e) Supplementing Disclosures and Responses.

(1) In General. A party who has made a disclosure under Rule 26(a)--or who has responded to an interrogatory, request for production, or request for admission--must supplement or correct its disclosure or response:

- (A) in a timely manner if the party learns that in some material respect the disclosure or response is incomplete or incorrect, and if the additional or corrective information has not otherwise been made known to the other parties during the discovery process or in writing; or
- (B) as ordered by the court.

Fed. R. Civ. P. 26(e)(1). In other words, "Rule 26(e), in relevant part, requires that parties timely supplement or correct information disclosed to the opposing party through mandatory disclosures outlined in 26(a) or responses to interrogatories, requests for production, and requests for admissions, if and when the party learns their previous disclosures were materially incorrect or incomplete." Digital Vending Servs. Int'l, Inc. v. Univ. of Phoenix, Inc., 2:09CV555, 2013 WL 5533233 (E.D. Va. Oct. 3, 2013), appeal dismissed (Nov. 21, 2013) (emphasis added). The rule also "prohibits parties who are aware of their deficient response from 'hold[ing] back material items and disclos[ing] them at the last moment.'"
Woods v. DeAngelo Marine Exhaust, Inc., 692 F.3d 1272, 1282 (Fed. Cir. 2012) (quoting 8A Charles Alan Wright & Arthur R.

Miller, Federal Practice and Procedure § 2049.1 (3d ed. 2011)). These rules find application in the dispute before the Court over supplementation of contention interrogatory responses. "Contention interrogatories-like the interrogatory here-serve an important purpose in helping . . . to narrow and sharpen the issues[,] thereby confining discovery and simplifying trial preparation." Id. at 1280 (internal citations omitted).

II. DISCUSSION

1. Regarding VIS I- Case No. 2:12cv548

VIS's expert, Dr. Arthur T. Brody, did not address the doctrine of equivalents or the similarities of HDMI to MHL in his August 8, 2013 expert report in VIS I. Dec. of Susan Van Keulen, Ex. 6, Parts 2 & 3 at 47-53, 59-89; Ex. 7 at 14-15, ECF No. 474-7 (Case No. 2:12cv548), ECF No. 177-7 (Case No. 2:13cv332); Dec. of Susan Van Keulen, Ex. 6, Part 3 at 90-122, ECF No. 474-8 (Case No. 2:12cv548), ECF No. 177-8 (Case No. 2:13cv332); Dec. of Susan Van Keulen, Ex. 7 at 14-15 ECF No. 459-7 (Case No. 2:12cv548), ECF No. 177-4 (Case No. 2:13cv332). It was not until Dr. Brody's VIS II Opening Expert Report, dated February 7, 2014, that VIS indicated their intent to assert infringement of the asserted claims of the '268, '381, and '398 patents under the doctrine of equivalents. Dec. of Susan Van Keulen, Ex. 3, Part 2 at 59-62, 66-69, & 79-82, ECF No. 474-4 (Case No. 2:12cv548), ECF No. 177-4 (Case No. 2:13cv332). This

was well after the close of motions practice in VIS I, on August 13, 2013, and after the close of all discovery, including expert discovery, in VIS I, on October 8, 2013. See Scheduling Orders, ECF No. 56 & 202 (Case No. 2:12cv548). Furthermore, VIS failed to supplement its response to the contention interrogatories in VIS I with the doctrine of equivalents contentions, as it was obligated to do under Rule 26(e).

Having found that VIS has failed to comply with Rule 26, in accordance with Rule 37(c), the Court considers whether such failure was justified or harmless. The Court has "broad discretion to determine whether a nondisclosure of evidence is substantially justified or harmless." Southern States, 318 F.3d at 597. In making such determination the Court is required to consider the following factors: "(1) the surprise to the party against whom the evidence would be offered; (2) the ability of that party to cure the surprise; (3) the extent to which allowing the explanation would disrupt the trial; (4) the importance of the evidence; and (5) the nondisclosing party's explanation for its failure to disclose the evidence." Campbell, 470 F. App'x at 156 (citing Southern States, 318 F.3d at 597).

VIS has presented no excuse to justify its late disclosure, as VIS admits that the information on which the doctrine of equivalents theory is based was included in Dr. Brody's expert

report in VIS I of August 8, 2013. Response to Mot. #11 at 2, ECF No. 486 (Case No. 2:12cv548), ECF No. 188 (Case No. 2:13cv332). Furthermore, the Court finds that VIS's failure to comply with Rule 26 is not harmless in this instance, particularly with respect to factors 4 and 5 of the Southern States factors. Federal Rules of Civil Procedure 26(e) and 37(c) "prohibit[] parties who are aware of their deficient response from 'hold[ing] back material items and disclos[ing] them at the last moment.'" Woods, 692 F.3d at 1282 (quoting 8A Charles Alan Wright & Arthur R. Miller, Federal Practice and Procedure § 2049.1 (3d ed. 2011)). Therefore, for failure to comply with the requirements of Rule 26, the Court imposes the "'automatic sanction' of exclusion of a party's [evidence]."Campbell, 470 F. App'x at 156; Southern States, 318 F.3d at 592 n.2. Accordingly, the Court **GRANTS** Defendants' motion in limine with regard to VIS I. ECF No. 443 (Case No. 2:12cv548).

2. Regarding VIS II-2:13cv332

Although the admissibility of "arguments and evidence in support of" the doctrine of equivalents theory is more appropriately addressed here, in the interest of expediency, the Court considered the merits of the doctrine of equivalents theory of infringement in its April 11, 2014 Opinion and Order on Samsung's partial summary judgment motion. In so doing, the Court found such doctrine of equivalents theory to fail as a

matter of law and granted summary judgment in favor of Samsung. Therefore, the question of whether the arguments and evidence in support of such should be barred, pursuant to Federal Rules of Civil Procedure 26(e) and 37(c), is moot. Thus, with regard to VTS II, Defendants' motion in limine is **DENIED as moot**.

III. CONCLUSION

For the reasons stated above, Samsung's Motion in Limine #11 is **GRANTED, in part, and DENIED, in part.** Mot. in Lim. #11, ECF No. 443 (Case No. 2:12cv548), ECF No. 149 (Case No. 2:13cv332).

The Court **GRANTS** the motion with regard to VTS I, 2:12cv548. Mot. in Lim. #11, ECF No. 443 (Case No. 2:12cv548). However, with regard to VTS II, 2:13cv332, the Court **DENIES** the motion **as moot**. Mot. in Lim. #11, ECF No. 149 (Case No. 2:13cv332).

The Clerk is **DIRECTED** to send a copy of this Order to all counsel of record.

IT IS SO ORDERED.

/s/ 

Mark S. Davis

UNITED STATES DISTRICT JUDGE

Norfolk, Virginia
April 11, 2014

UNITED STATES DISTRICT COURT
EASTERN DISTRICT OF VIRGINIA
Norfolk Division

VIRGINIA INNOVATION
SCIENCES, INC.,

Plaintiff,
v.

Case No.: 2:12cv548
Case No.: 2:13cv332

SAMSUNG ELECTRONICS CO.,
LTD., ET AL.,

Defendants.

ORDER

This matter is before the Court on Motion in Limine #11 filed by Samsung Electronics Co., Ltd., Samsung Electronics America, Inc., and Samsung Telecommunications America, LLC (collectively "Samsung" or "Defendants"). Mot. in Lim. #11, ECF No. 443 (Case No. 2:12cv548), ECF No. 149 (Case No. 2:13cv332). Samsung moves to bar Virginia Innovation Sciences, Inc. (hereinafter "VIS" or "Plaintiff") from "arguing or presenting evidence that Samsung's MHL-enabled smartphones directly infringe the asserted claims of U.S. Patent Nos. 8,145,268 ("the '268 Patent"), 8,224,381 ("the '381 Patent) and 8,135,398 ("the '398 Patent")" under the doctrine of equivalents, pursuant to Federal Rules of Civil Procedure 26 and 37. Mem. in Supp. 1, ECF No. 444 (Case No. 2:12cv548), ECF No. 150 (Case No. 2:13cv332).

I. STANDARD OF REVIEW

Federal Rule of Civil Procedure 37(c) provides, in relevant part, that "[i]f a party fails to provide information . . . as required by Rule 26(a) or (e), the party is not allowed to use that information [] to supply evidence on a motion, at a hearing, or at a trial, unless the failure was substantially justified or is harmless." Fed. R. Civ. P. 37(c)(1). As the United States Court of Appeals for the Fourth Circuit has held, "and as the language of Rule 37(c)(1) evidences, the Federal Rules impose an 'automatic sanction' of exclusion of a party's [evidence] for failure to adhere to" the requirements set forth in Rule 26. Campbell v. United States, 470 F. App'x 153, 156 (4th Cir. 2012); see also Southern States Rack And Fixture, Inc. v. Sherwin-Williams Co., 318 F.3d 592, 592 n.2 (4th Cir. 2003) ("The Rule 37(c) advisory committee notes emphasize that the automatic sanction of exclusion provides a strong inducement for disclosure of material that the disclosing party would expect to use as evidence.") (internal quotation marks and citation omitted). Thus, the relevant inquiry is whether Plaintiff failed to provide required information under Rule 26(e) and, if so, whether that failure was substantially justified or harmless.

The provision of Federal Rule of Civil Procedure 26 governing the supplementation of interrogatories states the following:

(e) Supplementing Disclosures and Responses.

(1) In General. A party who has made a disclosure under Rule 26(a)--or who has responded to an interrogatory, request for production, or request for admission--must supplement or correct its disclosure or response:

- (A) in a timely manner if the party learns that in some material respect the disclosure or response is incomplete or incorrect, and if the additional or corrective information has not otherwise been made known to the other parties during the discovery process or in writing; or
- (B) as ordered by the court.

Fed. R. Civ. P. 26(e)(1). In other words, "Rule 26(e), in relevant part, requires that parties timely supplement or correct information disclosed to the opposing party through mandatory disclosures outlined in 26(a) or responses to interrogatories, requests for production, and requests for admissions, if and when the party learns their previous disclosures were materially incorrect or incomplete." Digital Vending Servs. Int'l, Inc. v. Univ. of Phoenix, Inc., 2:09CV555, 2013 WL 5533233 (E.D. Va. Oct. 3, 2013), appeal dismissed (Nov. 21, 2013) (emphasis added). The rule also "prohibits parties who are aware of their deficient response from 'hold[ing] back material items and disclos[ing] them at the last moment.'"
Woods v. DeAngelo Marine Exhaust, Inc., 692 F.3d 1272, 1282 (Fed. Cir. 2012) (quoting 8A Charles Alan Wright & Arthur R.

Miller, Federal Practice and Procedure § 2049.1 (3d ed. 2011)). These rules find application in the dispute before the Court over supplementation of contention interrogatory responses. "Contention interrogatories-like the interrogatory here-serve an important purpose in helping . . . to narrow and sharpen the issues[,] thereby confining discovery and simplifying trial preparation." Id. at 1280 (internal citations omitted).

II. DISCUSSION

1. Regarding VIS I- Case No. 2:12cv548

VIS's expert, Dr. Arthur T. Brody, did not address the doctrine of equivalents or the similarities of HDMI to MHL in his August 8, 2013 expert report in VIS I. Dec. of Susan Van Keulen, Ex. 6, Parts 2 & 3 at 47-53, 59-89; Ex. 7 at 14-15, ECF No. 474-7 (Case No. 2:12cv548), ECF No. 177-7 (Case No. 2:13cv332); Dec. of Susan Van Keulen, Ex. 6, Part 3 at 90-122, ECF No. 474-8 (Case No. 2:12cv548), ECF No. 177-8 (Case No. 2:13cv332); Dec. of Susan Van Keulen, Ex. 7 at 14-15 ECF No. 459-7 (Case No. 2:12cv548), ECF No. 177-4 (Case No. 2:13cv332). It was not until Dr. Brody's VIS II Opening Expert Report, dated February 7, 2014, that VIS indicated their intent to assert infringement of the asserted claims of the '268, '381, and '398 patents under the doctrine of equivalents. Dec. of Susan Van Keulen, Ex. 3, Part 2 at 59-62, 66-69, & 79-82, ECF No. 474-4 (Case No. 2:12cv548), ECF No. 177-4 (Case No. 2:13cv332). This

was well after the close of motions practice in VIS I, on August 13, 2013, and after the close of all discovery, including expert discovery, in VIS I, on October 8, 2013. See Scheduling Orders, ECF No. 56 & 202 (Case No. 2:12cv548). Furthermore, VIS failed to supplement its response to the contention interrogatories in VIS I with the doctrine of equivalents contentions, as it was obligated to do under Rule 26(e).

Having found that VIS has failed to comply with Rule 26, in accordance with Rule 37(c), the Court considers whether such failure was justified or harmless. The Court has "broad discretion to determine whether a nondisclosure of evidence is substantially justified or harmless." Southern States, 318 F.3d at 597. In making such determination the Court is required to consider the following factors: "(1) the surprise to the party against whom the evidence would be offered; (2) the ability of that party to cure the surprise; (3) the extent to which allowing the explanation would disrupt the trial; (4) the importance of the evidence; and (5) the nondisclosing party's explanation for its failure to disclose the evidence." Campbell, 470 F. App'x at 156 (citing Southern States, 318 F.3d at 597).

VIS has presented no excuse to justify its late disclosure, as VIS admits that the information on which the doctrine of equivalents theory is based was included in Dr. Brody's expert

report in VIS I of August 8, 2013. Response to Mot. #11 at 2, ECF No. 486 (Case No. 2:12cv548), ECF No. 188 (Case No. 2:13cv332). Furthermore, the Court finds that VIS's failure to comply with Rule 26 is not harmless in this instance, particularly with respect to factors 4 and 5 of the Southern States factors. Federal Rules of Civil Procedure 26(e) and 37(c) "prohibit[] parties who are aware of their deficient response from 'hold[ing] back material items and disclos[ing] them at the last moment.'" Woods, 692 F.3d at 1282 (quoting 8A Charles Alan Wright & Arthur R. Miller, Federal Practice and Procedure § 2049.1 (3d ed. 2011)). Therefore, for failure to comply with the requirements of Rule 26, the Court imposes the "'automatic sanction' of exclusion of a party's [evidence]."Campbell, 470 F. App'x at 156; Southern States, 318 F.3d at 592 n.2. Accordingly, the Court **GRANTS** Defendants' motion in limine with regard to VIS I. ECF No. 443 (Case No. 2:12cv548).

2. Regarding VIS II-2:13cv332

Although the admissibility of "arguments and evidence in support of" the doctrine of equivalents theory is more appropriately addressed here, in the interest of expediency, the Court considered the merits of the doctrine of equivalents theory of infringement in its April 11, 2014 Opinion and Order on Samsung's partial summary judgment motion. In so doing, the Court found such doctrine of equivalents theory to fail as a

matter of law and granted summary judgment in favor of Samsung. Therefore, the question of whether the arguments and evidence in support of such should be barred, pursuant to Federal Rules of Civil Procedure 26(e) and 37(c), is moot. Thus, with regard to VTS II, Defendants' motion in limine is DENIED as moot.

III. CONCLUSION

For the reasons stated above, Samsung's Motion in Limine #11 is GRANTED, in part, and DENIED, in part. Mot. in Lim. #11, ECF No. 443 (Case No. 2:12cv548), ECF No. 149 (Case No. 2:13cv332).

The Court GRANTS the motion with regard to VTS I, 2:12cv548. Mot. in Lim. #11, ECF No. 443 (Case No. 2:12cv548). However, with regard to VTS II, 2:13cv332, the Court DENIES the motion as moot. Mot. in Lim. #11, ECF No. 149 (Case No. 2:13cv332).

The Clerk is DIRECTED to send a copy of this Order to all counsel of record.

IT IS SO ORDERED.

/s/ 

Mark S. Davis

UNITED STATES DISTRICT JUDGE

Norfolk, Virginia
April 11, 2014

UNITED STATES DISTRICT COURT
EASTERN DISTRICT OF VIRGINIA
Norfolk Division

VIRGINIA INNOVATION
SCIENCES, INC.,

Plaintiff,

v.

Case No.: 2:12cv548

SAMSUNG ELECTRONICS CO.,
LTD., ET AL.,

Defendants.

OPINION AND ORDER

Plaintiff, Virginia Innovation Sciences, Inc. ("Plaintiff" or "VIS"), asks this Court to reconsider its January 8, 2014 summary judgment Order granting, in part, the summary judgment motion of invalidity filed by defendants, Samsung Electronics Co., Ltd., Samsung Electronics America, Inc., and Samsung Telecommunications America, LLC (collectively "Samsung" or "Defendants"). ECF No. 416. Plaintiff asserts that new evidence justifies reconsideration of the summary judgment Order because, during the course of an *inter partes* review ("IPR") proceeding, the United States Patent and Trademark Office's ("PTO") Patent Trial and Appeal Board ("PTAB") issued preliminary decisions regarding institution of IPR on the patents-in-suit, with conclusions that are partially different

from this Court's summary judgment Order. The motion has been fully briefed and is therefore ripe for decision.¹

I. FACTUAL AND PROCEDURAL BACKGROUND

A. General Background

At issue in this case are five² patents: U.S. Patent No. 7,899,492 ("the '492 patent"), U.S. Patent No. 8,050,711 ("the '711 patent"), U.S. Patent No. 8,145,268 ("the '268 patent"), U.S. Patent No. 8,224,381 ("the '381 patent"), and U.S. Patent No. 8,135,398 ("the '398 patent"). All of the patents-in-suit are continuations or continuations-in-part of the '492 patent, titled "Methods, Systems and Apparatus for Displaying the Multimedia Information from Wireless Communication Networks." The patents-in-suit address the conversion of mobile terminal multimedia signals into a format for use by an alternative display, and each of the patents-in-suit describes inventions intended to resolve the inconvenience and impracticability of viewing multimedia content on the small screens of mobile terminals.

¹ On April 10, 2014, the Court held a hearing on the motion for reconsideration, but the hearing focused more on issues relating to the *inter partes* review, and its effect on pending district court proceedings, than the substance of the motion to reconsider. Hr'g Tr., ECF No. 554.

² Previously, there were six patents at issue in this case. However, U.S. Patent No. 7,957,733 ("the '733 patent") is no longer asserted as infringed. Agreed Dismissal Order, ECF No. 408.

In the instant patent infringement action, filed on October 4, 2012, 2:12cv548 (hereinafter "VIS I"), Plaintiff alleges that Defendants have directly, indirectly, and willfully infringed the patents-in-suit by making, using, offering for sale, selling, and/or importing a wide range of accused products, including smartphones, tablets, Blu-ray players, and hubs. Pl.'s Am. Compl., ECF No. 121. Samsung denies VIS's claims of infringement and asserts several affirmative defenses, including invalidity or unenforceability of all patents-in-suit, prosecution history estoppel, and other equitable doctrines. Additionally, Samsung asserts counterclaims seeking declarations of non-infringement, invalidity, and unenforceability for each of the patents-in-suit.

On June 14, 2013, three days after the Court conducted a Markman hearing, Plaintiff filed a second patent infringement action, 2:13cv332 (hereinafter "VIS II"), alleging essentially the same causes of action as in VIS I, but with respect to Defendants' newly released products. Case No. 2:13cv332, ECF No. 1. In response, Samsung asserted essentially the same defenses and counterclaims as in VIS I. By Order of October 25, 2013, the Court joined for trial VIS I and VIS II, as the matters involve the same parties and the same patents-in-suit. ECF. No. 353. The Court then issued a new scheduling Order for the joined cases, and rescheduled the November 12, 2013 trial to

April 21, 2014. Case No. 2:13cv332, ECF No. 63. Pursuant to that scheduling Order, the parties narrowed the issues for trial and Plaintiff made its final election of claims it would assert at trial, none of which is the subject of Plaintiff's motion for reconsideration. The April 21, 2014 trial of the two joined cases has been continued to May 27, 2014.

B. Summary Judgment and IPR

On August 13, 2013, Defendants filed a motion for summary judgment in this Court, seeking, among other things, a ruling of invalidity as to the patents-in-suit. On January 8, 2014, the Court ruled on Defendants' summary judgment motion in VIS I; granting, in part, and denying, in part, such motion. ECF No. 413. The Court found no willful infringement of any claims, and also found claims 21, 22, 25, 28, and 29 of the '268 patent, and claims 15, 60, 61 and 62 of the '398 patent, invalid as anticipated or obvious. *Id.* It is these findings of invalidity that Plaintiff asks the Court to reconsider, particularly the invalidity finding of claim 21 of the '268 patent as anticipated by prior art reference "Palin."

On September 5, 2013, at the same time VIS I and VIS II were proceeding before this Court, and while Defendant's summary judgment motion seeking a ruling of invalidity was pending, Defendants began parallel proceedings before the PTO directly challenging the validity of the patents-in-suit. Shortly

thereafter, on September 16, 2013, Defendants submitted to the PTO corrected petitions seeking IPR of 37 claims from the five patents-in-suit. Because the Director of the PTO has delegated the authority to institute IPR to the PTAB, the IPR petitions were submitted to the PTAB for consideration. Each of the claims that Defendants asked this Court to find invalid in their August 13, 2013 summary judgment motion of invalidity were included in the 37 claims that Defendants asked the three judge panel of the PTAB to find invalid in Defendants' September 16, 2013 IPR petitions.

Although the parties to this litigation notified the PTAB of the August 13, 2013 summary judgment motion pending before this Court, neither party advised this Court of the concurrent IPR petitions or requested a stay of Court proceedings pending a decision from the PTAB. Thus, on January 8, 2014, this Court issued its 72 page Opinion and Order ruling on the validity of the patents-in-suit without any knowledge that the exact same issues were the subject of an IPR petition pending before a three judge panel of the PTAB.

On March 6, 2014, the PTAB rendered its decisions regarding whether to instate IPR review of the five patents-in-suit, granting the request to review three of the patents ('268, '381, and '398), and denying the request to review two of the patents ('492 and '711). Pl.'s Reconsideration Mem., Exs. 1-5, ECF No.

417. Approximately one week later, the Court was finally apprised of the IPR proceedings when Plaintiff filed its motion for reconsideration of the Court's summary judgment ruling. ECF. No. 416. Plaintiff's brief in support of its motion highlights the substantive analysis included within the PTAB's decisions and argues that such rulings constitute "new evidence that was not available prior to this Court's Summary Judgment Order." Pl.'s Reconsideration Mem. 2, ECF No. 417. Moreover, Plaintiff argues that the PTAB's decisions should be afforded deference based on the PTAB's specialized knowledge and expertise. *Id.* at 4.

II. IPR AND THE DUTY OF CANDOR

Before addressing the motion to reconsider, the Court must address the IPR provisions of the Leahy-Smith America Invents Act ("AIA"), Pub. L. No. 112-29, 125 Stat. 284 (2011), codified at 35 U.S.C. §§ 311-319, and the impact of the IPR proceedings on the district court proceedings.

A. The IPR Procedure

The IPR procedure enacted by Congress in 2011 allows third parties to challenge a patent's validity by seeking IPR. "The IPR process set out in the AIA represents a 'new, more streamlined adjudicative proceeding' intended to replace the more cumbersome and time-consuming *inter partes* reexamination that could take upwards of three years to conclude." Rensselaer

Polytechnic Institute v. Apple Inc., No. 1:13cv633, 2014 U.S. Dist. LEXIS 5186, at *5 (N.D.N.Y. Jan. 15, 2014) (hereinafter "Rensselaer") (quoting Ultratec, Inc. v. Sorenson Commc'nns, Inc., No. 13-CV-346, 2013 U.S. Dist. LEXIS 162459, at *3 (W.D. Wisc. Nov. 14, 2013)); see Abbott Labs. v. Cordis Corp., 710 F.3d 1318, 1326 (Fed. Cir. 2013) (recognizing that the AIA changed the PTO's review process from "an examinational to an adjudicative proceeding") (emphasis added). IPR "is designed to improve upon the previous *inter partes* re-examination process by '(1) . . . reduc[ing] to 12 months the time the PTO spends reviewing validity, from the previous reexamination average of 36.2 months; (2) . . . minimiz[ing] duplicative efforts by increasing coordination between district court litigation and *inter partes* review; and (3) . . . allow[ing] limited discovery in the review proceedings.'" Automatic Mfg. Sys., Inc. v. Primera Technology, Inc., No. 6:12cv1727, 2013 U.S. Dist. LEXIS 165692, at *5 (M.D. Fla. November 21, 2013) (quoting Universal Elecs., Inc. v. Universal Remote Control, Inc., 943 F. Supp. 2d 1028, 1029-30 (C.D. Cal. 2013))³ (alteration in original)).

"Under the procedures governing IPR, which became effective on September 16, 2012, a request for review must be filed by the

³ In Universal Electronics, the Court's summary of the improvements resulting from the new IPR procedure relied on Changes to Implement Inter Partes Review Proceedings, Post-Grant Review Proceedings, and Transitional Program for Covered Business Method Patents, 77 Fed. Reg. 48,680 (Aug. 14, 2012) (codified at 37 C.F.R. §§ 42.100 et seq.).

petitioner within one year of being served with a complaint alleging infringement of the patent in issue." Rensselaer, 2014 U.S. Dist. LEXIS 5186, at *5 (citing 35 U.S.C. § 315(b)). "On *inter partes* review, a petitioner can challenge the validity of a patent only on grounds that could be raised under 35 U.S.C. § 102 (prior art) or 35 U.S.C. § 103 (obviousness), and only then 'on the basis of prior art consisting of patents or printed publications.'" Automatic Mfg. Sys., 2013 U.S. Dist. LEXIS 165692, at *5-6 (quoting 35 U.S.C. § 311(b)). "Once an IPR petition is filed, the patent owner may submit a preliminary response within three months, or may instead expedite the process by waiving the right to submit a preliminary response." Rensselaer, 2014 U.S. Dist. LEXIS 5186, at *6 (citing 35 U.S.C. § 313; 37 C.F.R. § 42.107(b)). "An IPR trial may be initiated by the PTO if the petitioner demonstrates a reasonable likelihood of prevailing with respect to at least one challenged claim." Id. at *7 (citing 35 U.S.C. § 314(a)). "The PTO must decide whether to institute IPR within three months of the filing of the preliminary response, or, if no response is filed, [within three months of] [] the last date on which a response may be filed." Evolutionary Intelligence LLC v. Yelp Inc., No. 13-CV-3587, 2013 U.S. Dist. LEXIS 178547, at *7 (N.D. Cal. Dec. 18, 2013) (citing 35 U.S.C. § 314(b)). "The Director [of the PTO], by regulation, has delegated to the [PTAB] the authority

under section 314 to decide whether to institute an *inter partes* review." St. Jude Medical, Cardiology Div., Inc. v. Volcano Corp., No. 2014-1183, 2014 U.S. App. LEXIS 7731, at *4 n.1 (Fed. Cir. Apr. 24, 2014) (citing 37 C.F.R. §§ 42.4 & 42.108). Accordingly, when the PTAB makes "the review-instituting decision, it is exercising the Director's section 314 authority." Id.

As the Rensselaer court noted, "[u]nlike the prior *inter partes* reexamination proceeding, which was accomplished largely through submissions before a PTO examiner, IPR under the AIA is conducted before a panel of three of the technically-trained administrative judges comprising the Patent Trial and Appeal Board ('PTAB')."Rensselaer, 2014 U.S. Dist. LEXIS 5186, at *7-8 (citing 35 U.S.C. § 6(a), (c)). "On review, [this PTAB three judge panel of] the PTO can invalidate any claim before it, and the petitioner is collaterally estopped from later asserting in a civil action 'that the claim is invalid on any ground that the petitioner raised or reasonably could have raised during that *inter partes* review.'" Automatic Mfg. Sys., 2013 U.S. Dist. LEXIS 165692, at *6 (citing 35 U.S.C. § 315(e)(2)). If the "IPR is initiated, the PTAB must issue a final determination within one year after commencement, although that period may be extended, for good cause, to eighteen months." Rensselaer, 2014 U.S. Dist. LEXIS 5186, at *8 (citing 35 U.S.C. § 316(a)(11)).

Any "party dissatisfied with the PTAB's final decision may appeal the determination to the Federal Circuit." *Id.* (citing 35 U.S.C. § 141). "Given this timeframe, IPR can take [up to] two years before the PTO, and an appeal to the Federal Circuit can extend that timeline further." *Id.* Of course, IPR can also take less than two years under these timeframes, and the preclusive effect of a PTAB final determination is triggered when the PTAB issues its final written decision - regardless of whether an appeal is taken to the Federal Circuit. Compare 35 U.S.C. §§ 315(e), 318, and 319 (triggering estoppel upon issuance of PTAB final determination on IPR), with Bettcher Indus., Inc. v. Bunzl USA Inc., 661 F.3d 629, 642-47 (Fed. Cir. 2011) (triggering estoppel when all court review of *inter partes* reexamination determination has been exhausted).

The impact of the new IPR procedure is only beginning to be experienced. Empirical data as of April 17, 2014 reflect that, in fiscal year 2013, there were 203 decisions issued by the PTAB regarding institution of *inter partes* review. Patent Trial and Appeal Board, AIA Progress, http://www.uspto.gov/ip/boards/bpai/stats/041714_aia_stat_graph.pdf. Of the 203, trials were instituted in 167, 10 were joined with existing proceedings, and 26 were denied - meaning that trial was instituted in approximately 87% of the cases. *Id.* Thus far in fiscal year 2014, there were 335 decisions issued by the PTAB regarding

institution of *inter partes* review. Id. Of the 335, trials were instituted in 267, 1 was joined with an existing proceeding, and 67 were denied - meaning that the percentage of trials instituted dropped somewhat to approximately 80%. Id.

B. Impact of IPR on District Court Litigation

A party simultaneously litigating a patent infringement case in federal court and an IPR proceeding before the PTAB must consider the impact of each proceeding on the other. For example, the AIA provides that "[i]f the petitioner or real party in interest files a civil action challenging the validity of a claim of the patent on or after the date on which the petitioner files a petition for *inter partes* review of the patent, that civil action will be automatically stayed until either the patent owner moves the court to lift the stay, the patent owner files a civil action or counterclaim alleging that the petitioner or real party in interest has infringed the patent, or the petitioner or real party in interest moves the court to dismiss the civil action." 60 Am. Jur. 2d Patents § 411 (2014) (citing 35 U.S.C. § 315(a)(2)). However, "[a] counterclaim challenging the validity of a claim of a patent does not constitute a civil action challenging the validity of a claim of a patent" within the meaning of 35 U.S.C. § 315(a)(2). Id. (citing 35 U.S.C. § 315(a)(3)). Therefore, when an IPR petition is filed by a party to district court patent

infringement litigation involving invalidity counterclaims, the AIA does not contain a mandatory provision requiring a stay of the district court patent infringement proceedings.⁴ Accordingly, the decision of whether to stay the district court proceedings in such a scenario is left to the district court's discretion - that is, if the district court knows about the IPR proceeding. See Proctor & Gamble Co. v. Kraft Foods Global, Inc., 549 F.3d 842, 848-49 (Fed. Cir. 2008) ("The Supreme Court has long recognized that district courts have broad discretion

⁴ When the AIA was introduced as H.R. 1249 in the House of Representatives, it contained a section 320, describing criteria a district court should use in deciding whether to grant a stay of such litigation. However, section 320 was later omitted by amendment before the AIA was adopted. Section 320 provided that: "If a party seeks a stay of a civil action alleging infringement of a patent under section 281, or a proceeding before the International Trade Commission under section 337 of the Tariff Act of 1930, relating to an inter partes review under this chapter, the court shall decide whether to enter a stay based on (1) whether a stay, or the denial thereof, will simplify the issues in question, and streamline the trial; (2) whether discovery is complete and whether a trial date has been set; (3) whether a stay, or the denial thereof, would unduly prejudice the non-moving party or present a clear tactical advantage for the moving party; and (4) whether a stay, or the denial thereof, will reduce the burden of litigation on the parties and on the court." H.R. Doc. No. 112-35 at 16 (2011). The omission of such provision from the final version of the statute means that a district court remains free to use its own discretion, and appropriate factors, in exercising its inherent power to grant or deny a stay. See Proctor & Gamble Co. v. Kraft Foods Global, Inc., 549 F.3d 842, 849 (Fed. Cir. 2008) (explaining that former 35 U.S.C. § 318 involving reexamination only supplemented the "inherent power of the district courts to grant a stay pending reexamination of a patent"); see also Cherokee Nation of Oklahoma v. United States, 124 F.3d 1413, 1416 (Fed. Cir. 1997) (describing balancing test for staying action); Peschke Map Techs., LLC v. J.J. Gumberg Co., Civ. Nos. 12-1525, 1527, 1528, 1530, 1572 & 1574, 2014 U.S. Dist. LEXIS 57113, at *5 (D. Del. Apr. 24, 2014) (granting stay pending PTAB inter partes review); ePlus, Inc. v. Lawson Software, Inc., No. 3:09cv620, 2010 U.S. Dist. LEXIS 31322, *5 (E.D. Va. Mar. 31, 2010) (applying stay standard in patent case involving patent reexamination).

to manage their dockets, including the power to grant a stay of proceedings.”).

Here, it seems obvious to this Court that VIS and Samsung should have notified the Court that IPR petitions were filed in September 2013, and that such IPR petitions addressed the same assertions of invalidity that were then being considered by the Court. However, because counsel for both parties assert that it never occurred to them that they had a duty to notify this Court, it is necessary to review such duty and remind counsel of their obligation to the Court with respect to such duty.⁵

⁵ During the April 10, 2014 hearing before this Court, Plaintiff stated that the failure to advise this Court of the pending PTAB proceeding was not intentional, and that counsel had never even discussed or considered whether they should advise the Court of the concurrent PTAB proceeding. Hr’g Tr. 7-8, ECF No. 554. In a post-hearing brief, VIS later stated that “Samsung raised its intention to file IPR requests when the parties met with Magistrate Judge Miller on August 29, 2013 for a settlement conference in VIS I.” ECF No. 558. The Court takes the parties at their word regarding their assertions that they did not intend to conceal such PTAB proceedings when they failed to advise this Court of the IPR. However, it must be noted that the discussions that occur during settlement conferences are confidential. In order to encourage the parties to enter into candid and fulsome discussions, the district judge and magistrate judge co-assigned to cases do not discuss the substance of such settlement conferences. This policy is reflected in the Settlement Conference Order entered by Judge Miller on July 24, 2013, which provides that “[t]he undersigned will not disclose the information received during the settlement conference to anyone without the permission of the party providing the information.” ECF No. 118. Moreover, E.D. Va. Loc. Civ. Rule 83.6(e) describes the rules governing mediation, including settlement conferences, and provides that “[t]he substance of communications in the mediation process shall not be disclosed to any person other than participants in the mediation process.”

1. Duty of Candor and Good Faith

This Court has adopted a local rule regarding the ethical standards applicable to cases before the Court. It provides that "[t]he ethical standards relating to the practice of law in civil cases in this Court shall be Section II of Part Six of the Rules of the Virginia Supreme Court as it may be amended or superseded from time to time." E.D. Va. Loc. Civ. R. 83.1. Rule 3.3 of those Rules of Professional Conduct is entitled "Candor Toward The Tribunal." Va. Rule Prof'l Conduct 3.3. Subsection (a)(2) of that Rule provides that "[a] lawyer shall not knowingly . . . fail to disclose a fact to a tribunal when disclosure is necessary to avoid assisting a criminal or fraudulent act by the client." *Id.* Comment 1 to the Rule observes that "[t]he advocate's task is to present the client's case with persuasive force. Performance of that duty while maintaining confidences of the client is qualified by the advocate's duty of candor to the tribunal." *Id.* Comment 3 to the Rule, entitled "Representations by a Lawyer," further provides that "[t]here are circumstances where failure to make a disclosure is the equivalent of an affirmative misrepresentation." *Id.* In addition to the Rule 3.3 duty of candor, there is also a broader general duty of candor and good faith that encompasses an attorney's duty to advise a district court of any development that may affect the outcome of the

litigation. United States v. Shaffer Equip. Co., 11 F.3d 450, 457-59 (4th Cir. 1993). These general principles, and the relationship between this general duty to advise and the Rule 3.3 duty of candor, have been discussed at length by the United States Court of Appeals for the Fourth Circuit.

In the following passage from Shaffer Equipment,⁶ the Fourth Circuit explained how these two duties apply:

It appears that the district court, in finding that the government's attorneys violated a duty of candor to the court, applied the general duty of candor imposed on all attorneys as officers of the court, as well as the duty of candor defined by Rule 3.3. Although the court referred to Rule 3.3, it also described the duty of candor more broadly as that duty attendant to the attorney's role as an officer of the court with a "continuing duty to inform the Court of any development which may conceivably affect the outcome of litigation." [United States v. Shaffer Equip. Co., 796 F. Supp. 938, 950 (S.D. W. Va. 1992).] It concluded, "Thus, attorneys are expected to bring directly before the Court all those conditions and circumstances which are relevant in a given case." Id. In its brief, the government did not address the existence, nature, and scope of any general duty of candor and whether its attorneys violated that duty. Nevertheless, we are confident that a general duty of candor to the court exists in connection with an attorney's role as an officer of the court.

Our adversary system for the resolution of disputes rests on the unshakable foundation that truth is the object of the system's process which is designed for

⁶ In Shaffer Equipment, the district court found that government attorneys breached their duty of candor in their efforts to recover the EPA's costs of cleaning up a hazardous waste site. The EPA on-site coordinator misrepresented his academic achievements and credentials and the government's attorneys wrongfully obstructed the defendants' efforts to "root out the discrepancies and failed to reveal them once they learned of them." 11 F.3d 450, 452.

the purpose of dispensing justice. However, because no one has an exclusive insight into truth, the process depends on the adversarial presentation of evidence, precedent and custom, and argument to reasoned conclusions--all directed with unwavering effort to what, in good faith, is believed to be true on matters material to the disposition. Even the slightest accommodation of deceit or a lack of candor in any material respect quickly erodes the validity of the process. As soon as the process falters in that respect, the people are then justified in abandoning support for the system in favor of one where honesty is preeminent.

While no one would want to disagree with these generalities about the obvious, it is important to reaffirm, on a general basis, the principle that lawyers, who serve as officers of the court, have the first line task of assuring the integrity of the process. Each lawyer undoubtedly has an important duty of confidentiality to his client and must surely advocate his client's position vigorously, but only if it is truth which the client seeks to advance. The system can provide no harbor for clever devices to divert the search, mislead opposing counsel or the court, or cover up that which is necessary for justice in the end. It is without note, therefore, that we recognize that the lawyer's duties to maintain the confidences of a client and advocate vigorously are trumped ultimately by a duty to guard against the corruption that justice will be dispensed on an act of deceit. See 1 Geoffrey C. Hazard, Jr. and W. William Hodes, *The Law of Lawyering* 575-76 (1990) ("Where there is danger that the tribunal will be misled, a litigating lawyer must forsake his client's immediate and narrow interests in favor of the interests of the administration of justice itself.").

While Rule 3.3 articulates the duty of candor to the tribunal as a necessary protection of the decision-making process, see Hazard at 575, and Rule 3.4 articulates an analogous duty to opposing lawyers, neither of these rules nor the entire Code of Professional Responsibility displaces the broader general duty of candor and good faith required to protect the integrity of the entire judicial process. The Supreme Court addressed this issue most recently

in Chambers v. NASCO, Inc., 501 U.S. 32, 115 L. Ed. 2d 27, 111 S. Ct. 2123 (1991). There, an attorney had taken steps to place certain property at issue beyond the jurisdiction of the district court and had filed numerous motions in bad faith, simply to delay the judicial process. The district court, the court of appeals, and the Supreme Court all agreed that neither Federal Rule of Civil Procedure 11 (subjecting to sanction anyone who signs a pleading in violation of the standards imposed by the rule) nor 28 U.S.C. § 1927 (subjecting to sanction anyone who "multiplies the proceedings . . . unreasonably and vexatiously") could reach the conduct. However, the Supreme Court accepted the district court's reliance on the inherent power to impose sanctions, rejecting arguments that Rule 11 and § 1927 reflect a legislative intent to displace a court's power to vacate a judgment upon proof that a fraud has been perpetrated upon the court:

We discern no basis for holding that the sanctioning scheme of the statute [28 U.S.C. § 1927] and the rules displaces the inherent power to impose sanctions for the bad faith conduct described above. These other mechanisms, taken alone or together, are not substitutes for the inherent power, for that power is both broader and narrower than other means of imposing sanctions. First, whereas each of the other mechanisms reaches only certain individuals or conduct, the inherent power extends to a full range of litigation abuses. At the very least, the inherent power must continue to exist to fill in the interstices.

[Chambers,] 501 U.S. at [46,] 111 S. Ct. at 2134 (emphasis added).

The general duty of candor and truth thus takes its shape from the larger object of preserving the integrity of the judicial system. For example, in Tiverton Board of License Commissioners v. Pastore, 469 U.S. 238, 83 L. Ed. 2d 618, 105 S. Ct. 685 (1985), counsel failed to apprise the Supreme Court that during the appeal process, one of the respondents, a liquor store challenging the admission of evidence at a Rhode Island liquor license revocation proceeding,

had gone out of business, rendering the case moot. Rebuking counsel for failing to comply with a duty of candor broader than Rule 3.3, the Supreme Court stated, "It is appropriate to remind counsel that they have a 'continuing duty to inform the Court of any development which may conceivably affect the outcome' of the litigation." Id. at 240 (quoting Fusari v. Steinberg, 419 U.S. 379, 391, 42 L. Ed. 2d 521, 95 S. Ct. 533 (1975) (Burger, C.J. concurring)) (emphasis added).

The general duty to preserve the integrity of the judicial process was similarly identified in Hazel-Atlas Glass Co. v. Hartford-Empire Co., 322 U.S. 238, 88 L. Ed. 1250, 64 S. Ct. 997 (1944). Without the support of any rule, the Court opened up a long-standing judgment because one of the litigants had introduced a document at trial which was later discovered to be fraudulent. The Supreme Court stated,

It is a wrong against the institutions set up to protect and safeguard the public, institutions in which fraud cannot complacently be tolerated consistently with the good order of society. Surely it cannot be that preservation of the integrity of the judicial process must always wait upon the diligence of litigants. The public welfare demands that the agencies of public justice be not so impotent that they must always be mute and helpless victims of deception and fraud.

Id. at 246 (emphasis added).

Shaffer Equip., Co., 11 F.3d at 457-59; see also Aptix Corp. v. Quickturn Design Sys., Inc., 269 F.3d 1369, 1379 (Fed. Cir. 2001) ("The duty of candor to the court is entitled to at least as much honor as that to the PTO.") (Mayer, C.J., dissenting).

2. Duty of Candor - Related Proceedings

This general and rule-based duty of candor finds application, among other places, in cases where two related matters are being adjudicated without counsel notifying each adjudicator of the related matter. A patent infringement suit with an invalidity counterclaim, and an IPR proceeding involving the validity of the same patent claims, fit into that category of related matters requiring notification to the respective adjudicative tribunals. At least one other court has found the duty of candor applicable in such circumstances. Rensselaer, 2014 U.S. Dist. LEXIS 5186, at *16. In Rensselaer, the district court explained that “[w]hile Apple filed its IPR petition on October 21, 2013, it was not until December 9, 2013, that it requested permission to bring the instant motion [to stay], which was filed on December 23, 2013.” Id. The court noted that in the interim, Apple had participated in a telephone conference with the court and “neglected to inform the court and plaintiffs that it had submitted an IPR petition to the PTO.” Id. The Rensselaer court also noted that, during a hearing on the motion to stay, “Apple did not offer a particularly persuasive reason for its lack of candor with the court and plaintiffs during the telephone conference regarding the fact that it had filed an IPR petition.” Id. (emphasis added).

In addition to such directly analogous case, federal courts in non-patent cases have long-recognized the existence of a duty of candor when related cases are simultaneously pending in different courts. In Cleveland Hair Clinic, Inc. v. Puig, 200 F.3d 1063, 1067-68 (7th Cir. 2000), an attorney appearing before a federal district court failed to disclose a state lawsuit he had prepared and was having simultaneously filed. Noting the Supreme Court's admonition that counsel have a continuing duty to inform the Court of any development which may conceivably affect the outcome of the litigation, Pastore, 469 U.S. at 240, and the Illinois Rule 3.3 duty of candor, the Seventh Circuit observed that "[t]he goal of the state lawsuit was to cut off the federal court at the pass, a development that surely could have affected the outcome of the litigation pending in federal court." Cleveland Hair Clinic, 200 F.3d at 1067-68.

In another case involving related litigation, Calleros v. FSI Int'l, Inc., 892 F. Supp. 2d 1163, 1165 (D. Minn. 2012), the plaintiff shareholder filed a suit in federal district court alleging that the defendant corporation, its officers, and directors, violated the Securities Exchange Act and their fiduciary duties by mailing incomplete and misleading disclosures in connection with a proposed tender offer by another company. However, the plaintiff shareholder failed to advise the district court that another shareholder had filed a

class-action suit in state court alleging that the same corporation's officers and directors violated their fiduciary duties by making incomplete and misleading disclosures in connection with the proposed transaction, and that two other similar state court class actions had also been filed. Id. at 1166. The district court noted that "[t]ellingly absent from [plaintiff's] Motion papers is any reference to the state-court cases raising nearly identical issues to the instant action." Id. at 1167. In deciding to stay its proceedings in favor of the related state court litigation, the district court observed that it was "troubled by the failure to mention the related state-court litigation," since "'[a]ttorneys, as officers of the court, have the responsibility to present the record with accuracy and candor.'" Id. at 1168 n.6 (quoting Pinkham v. Sara Lee Corp., 983 F.2d 824, 826 (8th Cir. 1992)). The district court concluded that "[i]t seems fairly apparent that counsel have flouted that obligation here." Id.; see also Perez v. Sanford-Orlando Kennel Club, Inc., 518 F.3d 1302, 1303 (11th Cir. 2008) (admonishing an attorney who failed to advise court of potentially jurisdiction-stripping events taking place before oral argument and then asking court to vacate opinion after losing his case).

This duty has also been applied in a non-patent context where there were federal district court proceedings and related

administrative proceedings pending at the same time. In U.S. Commodity Futures Trading Comm'n v. Lake Shore Asset Mgmt. Ltd., 540 F. Supp. 2d 994 (N.D. Ill. 2008) (hereinafter "Lake Shore"), the district court was faced with a situation involving a simultaneous administrative proceeding of which it was not informed. The district court, in a futures trading matter, had granted plaintiff's request for a statutory restraining order freezing defendant's assets, which order was later vacated by the Seventh Circuit's mandate. Id. at 996-97. "During this time period, unbeknownst to the court, the National Futures Association ("NFA"), which is not a party to this action, was working to freeze Lake Shore Ltd.'s assets via a completely different route by filing a member responsibility action ("MRA")." Id. at 997. Shortly after the Seventh Circuit vacated the district court's order, the NFA issued an asset freeze, which the district court learned of the same day when Lake Shore Ltd. filed an "emergency motion to enforce mandate." Id. The motion alleged that the federal statutorily-established NFA administrative action, which Lake Shore Ltd. had never previously mentioned to the district court or the Seventh Circuit, had been issued in violation of the Seventh Circuit's mandate and opinion. Id. The district court's opinion summarizing these events relied on both Cleveland Hair Clinic and Pastore in noting that it was "unclear why none of the

lawyers in this case told the court about the NFA member responsibility action prior to the issuance of the NFA asset freeze order, given that the preliminary injunction sought to freeze the very same assets at issue in the NFA action." Id. at 997 n.1.

3. Application of Duty of Candor to this Case

The context in which this Court learned of the related IPR litigation was slightly different from that in Rensselaer, and similar to that in Lake Shore, in that both VIS and Samsung knew of the September 2013 filing of the IPR petition, but neither of them informed the Court for six months. It was not until the PTAB ruled on institution, and VIS filed its motion to reconsider, that the Court was made aware of such concurrent proceeding. Of course, at the same time that Defendants were petitioning the PTAB for an adjudication of the validity of the patents at issue in this case, and Plaintiff was actively opposing such petitions, Defendants were also asking this Court to adjudicate the validity of the same patents and Plaintiff was actively opposing such efforts.

At the April 10, 2014 hearing before this Court on the motion to reconsider, the Court raised the issue of the parties' failure to notify the Court that they had begun the IPR proceeding. Hr'g Tr., ECF. No. 554. Counsel for each of the parties responded that it never occurred to them that they

should advise this Court of such parallel proceeding. Even after the Court noted that the AIA provides that, after a final written decision by the PTAB, a petitioner is collaterally estopped from later asserting in a civil action that the claim is invalid on any ground that the petitioner raised or reasonably could have raised during the *inter partes* review, Defendants seemed to suggest that they did not think to notify this Court of the IPR proceeding because this Court's docket moved so quickly. Hr'g Tr. 13, ECF No. 554.

The existence of such a parallel proceeding normally comes to the attention of the Court through one of the parties filing a motion to stay court proceedings in light the request for institution of IPR. See Universal Elecs., Inc., 943 F. Supp. 2d at 1030 (considering such a stay motion). However, that did not take place here. Had the parties promptly notified this Court of the pending petition, then the Court at least could have considered for itself what impact such related proceeding might have on the scheduling of matters,⁷ as well as whether it wished to stay the proceedings and its then-ongoing consideration of Defendants' summary judgment motion of invalidity. After all, "[a] stay is particularly appropriate, and within the court's 'sound discretion,' where the outcome of another case may

⁷ Had the Court known of the pending IPR proceeding on October 25, 2013, when it rescheduled the trial from November 12, 2013 to April 21, 2014, it could have factored such knowledge into its scheduling decision.

'substantially affect' or 'be dispositive of the issues' in a case pending before a district court." MEI, Inc. v. JCM Am. Corp., Civ. No. 09-351, 2009 U.S. Dist. LEXIS 96266, at *12-13 (D.N.J. Oct. 15, 2009) (quoting Bechtel Corp. v. Local 215, Laborers' Int'l Union of North America, 544 F.2d 1207, 1215 (3rd Cir. 1976)); see Brixham Solutions Ltd. v. Juniper Networks, Inc., Civ. No. 13-cv-616-JCS, 2014 U.S. Dist. LEXIS 58770, at *3-7 (N.D. Cal. April 28, 2014) (granting motion to stay patent infringement suit involving non-practicing entity pending *inter partes* review); see also Gould v. Control Laser Corp., 705 F.2d 1340, 1341 (Fed. Cir. 1983) (discussing trial court stay of patent infringement litigation during reexamination proceedings). Moreover, such stays may be initiated sua sponte. See Crown Cent. Petroleum Corp. v. Dep't of Energy, 102 F.R.D. 95, 98 (D. Md. 1984) ("A federal court has inherent power to stay, sua sponte, an action before it.") (citing Landis v. North Am. Co., 299 U.S. 248, 254-55 (1936)). And while, as Plaintiff has frequently noted, it is true that trials resolve cases, it is also true that a "final written decision" from the PTAB has preclusive effect and should therefore resolve cases. See 35 U.S.C. §§ 315(e), 318, and 319.

By failing to advise this Court of the existence of the IPR proceedings, VIS and Samsung in effect had two bites at the apple regarding the validity of the disputed claims. Moreover,

they deprived this Court of the opportunity to inquire of the parties and decide for itself whether to await a ruling from the PTAB on that issue. As the PTO noted in issuing its new rules of practice implementing the AIA, it was "anticipated that the rules will minimize duplication of efforts. . . . By requiring the filing of an *inter-partes* review petition earlier than a request for *inter-partes* reexamination, and by providing shorter timelines for *inter-partes* review compared with reexamination, it is anticipated that the current high level of duplication between litigation and reexamination will be reduced." 77 Fed. Reg. 48680, 48721. Needless to say, the practice adopted by the parties does not lend itself to promoting judicial efficiency or accomplishing some of the purposes Congress obviously intended with enactment of the AIA. Moreover, such practice may work a hardship on an entire district that seeks to expeditiously resolve its docket.

The parties should have notified this Court of the IPR petition as soon as it was filed, and the failure to do so appears, at least to the undersigned Judge, to have been a glaring omission. By not notifying the Court, counsel have, at the very least, failed to comply with their general duty of candor and good faith to this Court because the IPR proceeding was clearly a "development which may conceivably affect the outcome of the litigation" - a fact best demonstrated by

Plaintiff's filing of the motion for reconsideration. Pastore, 469 U.S. at 240.⁸ However, in light of the undeveloped state of the law on this relatively new PTO review procedure, this Court's admonition of all counsel involved in this case falls short of a formal reprimand of any of the individual lawyers.⁹ That said, the issuance of this Opinion is more than sufficient to place all patent practitioners on notice that future failures to disclose to the Court any concurrent *inter partes* review proceedings will be met with far sharper consequences.

Like the Lake Shore court, this Court "takes its obligation to promote civility and collegiality between the bench and bar very seriously," and only "prepared this opinion after a great deal of reflection." Lake Shore, 540 F. Supp. 2d at 996. However, the Court "cannot turn a blind eye to conduct that negatively impacts its ability to promote the orderly administration of justice and resolve disputes fairly." Id. It

⁸ In light of the Court's conclusion regarding the general duty of candor, it is not necessary for this Court to engage in further analysis regarding the Rule 3.3 duty of candor.

⁹ Although the replacement of *inter partes* reexamination by *inter partes* review effected a transformation from an examinational to an adjudicative proceeding, thus making the existence of concurrent PTO review proceedings more similar to the concurrent litigation cases discussed above, the prior reexamination process was still a related administrative proceeding that could "conceivably affect the outcome of the litigation." Pastore, 469 U.S. at 240. Accordingly, although the question is not squarely before this Court, there is a strong argument that even under the old *inter partes* reexamination process, the general duty of candor required parties to notify the Court of the filing of a petition for reexamination.

is this Court's hope that shining light on this issue will remind counsel in this case, and others, of their continuing duty to inform the Court of any development which may conceivably affect the outcome of the litigation. Pastore, 469 U.S. at 240. The Court now moves on to address the standard applicable to the motion to reconsider, as well as the substance of such motion.

III. STANDARD OF REVIEW - RECONSIDERATION

Because the motion for reconsideration is a procedural matter not unique to patent law, when considering such a motion, this Court looks to controlling Fourth Circuit precedent, rather than Federal Circuit precedent. Bowling v. Hasbro, 403 F.3d 1373, 1375 (Fed. Cir. 2005); Pennington Seed, Inc. v. Produce Exchange No. 299, 457 F.3d 1334, 1340 n.2 (Fed. Cir. 2006). Controlling Fourth Circuit law clearly provides that a summary judgment order, like the January 8, 2014 summary judgment Order at issue, "which did not resolve all claims against all parties, was interlocutory and thus subject to revision at any time." Saint Annes Dev. Co., Inc. v. Trabich, 443 F. App'x 829, 832 (4th Cir. 2011) (citing Fed. R. Civ. P. 54(b)). While final orders trigger heightened standards for reconsideration, see Fed. R. Civ. P. 59(e) and 60(b), interlocutory orders, such as orders of partial summary judgment, are not subject to those strict standards because "[a] district court retains the power

to reconsider and modify its interlocutory judgments, including partial summary judgments, at any time prior to final judgment when such is warranted.'" Saint Annes Dev. Co., 443 F. App'x at 832 (quoting American Canoe Ass'n v. Murphy Farms, Inc., 326 F.3d 505, 514-15 (4th Cir. 2003)); see Fed. R. Civ. P. 54(b) (providing that interlocutory orders that resolve fewer than all claims are "subject to revision at any time before the entry of [final] judgment"); Fayetteville Investors v. Commercial Builders, Inc., 936 F.2d 1462, 1469 (4th Cir. 1991) (same). The differing standards for interlocutory versus final orders are understandable, as significant time and resources are often invested in arriving at a final judgment. American Canoe Ass'n, 326 F.3d at 514.

The power to reconsider an interlocutory ruling "is committed to the discretion of the district court, . . . and doctrines such as law of the case . . . have evolved as a means of guiding that discretion." Id. at 515 (citing Moses H. Cone Mem. Hosp. v. Mercury Const. Corp., 460 U.S. 1, 12 (1983), Sejman v. Warner-Lambert Co., Inc., 845 F.2d 66, 69 (4th Cir. 1988)). A court's earlier decisions become law of the case and must generally be followed unless: "(1) a subsequent trial produces substantially different evidence, (2) controlling authority has since made a contrary decision of law applicable to the issue, or (3) the prior decision was clearly erroneous

and would work manifest injustice." Sejman, 845 F.2d at 69 (internal quotation marks omitted); see American Canoe Ass'n, 326 F.3d at 515 (explaining that although it is the "ultimate responsibility of [all levels of] the federal courts . . . to reach the correct judgment under law, . . . that obligation may be tempered at times by concerns of finality and judicial economy").

The law of the case doctrine, which guides this Court's reconsideration decision, "is not an 'inexorable command' but rather a prudent judicial response to the public policy favoring an end to litigation." Sejman, 845 F.2d at 68-69 (citations omitted). "As most commonly defined, the doctrine of the law of the case posits that when a court decides upon a rule of law, that decision should continue to govern the same issues in subsequent stages in the same case." Christianson v. Colt Indus. Operating Corp., 486 U.S. 800, 815-16 (1988) (internal citation and quotation marks omitted). The doctrine is "basically [a] simple principle of disciplined self-consistency" based on principles of finality and comity, as opposed to a lack of authority.¹⁰ 18B Wright, Miller & Cooper, Federal Practice

¹⁰ "The force of law-of-the-case doctrine is affected by the nature of the first ruling and by the nature of the issues involved. If the ruling is avowedly tentative or the issues especially important, it may be said that law-of-the-case principles do not apply. Different parties in separate proceedings likewise may fall outside law-of-the-case constraints Matters of fact, on the other hand, are unlikely candidates for reconsideration after the first full effort."

and Procedure: Jurisdiction § 4478 (2d ed. 2002). Stated differently, "[l]aw-of-the-case principles . . . are a matter of practice that rests on good sense and the desire to protect both court and parties against the burdens of repeated reargument by indefatigable diehards." Id.; see Christianson, 486 U.S. at 816 n.5 ("Perpetual litigation of any issue . . . delays, and therefore threatens to deny, justice."). It is a simple but unavoidable reality that district courts could not effectively and efficiently satisfy their responsibilities if every ruling were open to reconsideration based on better crafted legal argument. See Hilb Rogal & Hobbs Co. v. Rick Strategy Partners, Inc., No. 3:05cv355, 2006 WL 5908727, at *8 (E.D. Va. Feb. 10, 2006) ("Courts will not typically reconsider an interlocutory order where the motion to reconsider simply seeks 'to present a better and more compelling argument than the party could have presented in the original briefs.'" (quoting Madison River Mgmt. Co. v. Business Mgmt. Software Corp., 402 F. Supp. 2d 617, 619 (M.D.N.C. 2005))); 18B Wright, Miller & Cooper, Federal Practice and Procedure: Jurisdiction § 4478.1 (2d ed. 2002) ("A trial court could not operate if it were to yield to every request to reconsider each of the multitude of rulings that may be made between filing and final judgment."); see also Sejman, 845 F.2d

18B Wright, Miller & Cooper, Federal Practice and Procedure: Jurisdiction § 4478.5 (2d ed. 2002).

at 69 ("Clearly, courts could not perform their duties 'satisfactorily and efficiently . . . if a question once considered and decided . . . were to be litigated anew' in subsequent appeals. (quoting Great Western Tel. Co. v. Burnham, 162 U.S. 339, 344 (1896))).

Of course, "[a] court has the power to revisit prior decisions of its own or of a coordinate court in any circumstance, although as a rule courts should be loathe to do so in the absence of extraordinary circumstances such as where the initial decision 'was clearly erroneous and would work a manifest injustice.'" Christianson, 486 U.S. at 817 (quoting Arizona v. California, 460 U.S. 606, 618 n.8 (1983)). In line with Christianson, the Fourth Circuit has expressly recognized that a court may "depart[] from the law of the case when [a] previous decision [i]s 'clearly erroneous and would work manifest injustice.'" TFWS, Inc. v. Franchot, 572 F.3d 186, 192 (4th Cir. 2009) (quoting United States v. Aramony, 166 F.3d 655, 661 (4th Cir. 1999)). In applying such exception to the law of the case doctrine, the Fourth Circuit explained that "[a] prior decision does not qualify for this . . . exception by being just maybe or probably wrong; it must strike us as wrong with the force of a five-week-old, unrefrigerated dead fish." Id. at 194 (internal citations and quotation marks omitted). In other words, "[i]t must be 'dead wrong.'" Id. (citations omitted).

Accordingly, having determined that the above-described discretionary standard for reconsideration is the correct standard in the instant circumstances, the Court turns to the substantive analysis of the issues raised in the parties' briefs.

IV. DISCUSSION

Plaintiff's motion seeking reconsideration asserts that this Court should consider the recent PTAB decisions regarding institution to be "new evidence" and should give deference to the PTAB's findings due to the specialized knowledge and expertise of the PTO. Pl.'s Reconsideration Mem. 4, ECF No. 417 (citing PowerOasis, Inc. v. T-Mobile USA, Inc., 522 F.3d 1299, 1304 (Fed. Cir. 2008)). Defendants respond by arguing that the Court need not accord the decisions by the PTAB deference because "a decision by the USPTO that claims are valid over prior art is 'never binding on the court.'" Defs.' Opp. Mem. 7, ECF No. 465 (quoting Interconnect Planning Corp. v. Feil, 774 F. Supp. 2d 1132, 1139 (Fed. Cir. 1985) (emphasis added by Defendants)). Defendants further assert that no deference should be accorded the PTAB's decisions because they are only decisions regarding whether to institute IPR, not final decisions after PTAB adjudication. Moreover, Samsung argues that even these preliminary decisions to institute IPR, or not to institute IPR, are initial rulings subject to rehearing. Id. at 7-8. VIS

replies by asserting that its position is not that the PTAB rulings are binding on this Court, but that they should be afforded deference as a matter of law. Pl's Rebuttal Mem. 2, ECF No. 475 (citing Am. Hoist & Derrick Co. v. Sowa & Sons, Inc., 725 F.2d 1350, 1359 (Fed. Cir. 1986) abrogated on other grounds by Therasense, Inc. v. Becton, Dickinson & Co., 649 F.3d 1276, 1288-90 (Fed. Cir. 2011) (en banc)).

These assertions by Plaintiff seem to rely on the first two Sejman factors that our Court of Appeals directs district courts to utilize in deciding whether to reconsider an interlocutory ruling. Sejman, 845 F.2d at 69. However, the first of the three Sejman factors described above is not present in this case because no "subsequent trial produce[d] substantially different evidence" such that this Court should not follow its earlier decision. Id. No trial has taken place in this case. See Lincoln Nat'l Life Ins. Co. v. Roosth, 306 F.2d 110, 113 (5th Cir. 1962) (clearly referencing subsequent trial in same case as original decision in describing factor Sejman adopted). Therefore, there is no different evidence produced by "a trial" in this case. Moreover, even if the Court were to broadly construe the submission to the Court of the PTAB decisions as falling within the ambit of the first Sejman factor, such PTAB decisions still do not satisfy the first factor. As discussed more fully below, a decision on IPR institution is merely a

threshold determination as to whether, using the broadest reasonable interpretation of the claim terms, the petitioner has demonstrated that there is a reasonable likelihood of the patent claims being found invalid by a preponderance of the evidence. 37 C.F.R. § 542.100(b); 35 U.S.C. § 314(a); 35 U.S.C. § 316. As such, it is not a "trial" producing "evidence."

A. Deference Owed to PTAB's Decisions

Having determined that there is no subsequent trial producing substantially different evidence, the Court moves on to the second Sejman factor, and asks whether controlling authority has since made a contrary decision of law applicable to the issue at hand, such that the Court should not follow its earlier decision. Sejman, 845 F.2d at 69. PTO decisions regarding patentability can have a direct effect on pending litigation because the power to grant a patent is not one afforded to the courts, but is strictly within the domain of the PTO. See Patlex Corp. v. Mossinghoff, 758 F.2d 594, 604 on reh'g, 771 F.2d 480 (Fed. Cir. 1985) ("Validity often is brought into question in disputes between private parties, but the threshold question usually is whether the PTO, under the authority assigned to it by Congress, properly granted the patent. At issue is a right that can only be conferred by the government." (citing Crowell v. Benson, 285 U.S. 22, 50 (1932))). The Court therefore generally gives deference to

final PTO decisions, based in part on the PTO's specialized knowledge and expertise. See PowerOasis, Inc., 522 F.3d at 1304 (indicating that when the validity of an issued patent is challenged, and "'no prior art other than that which was [originally] considered by the PTO examiner is relied on by the attacker, he has the added burden of overcoming the deference that is due to a qualified government agency presumed to have properly done its job, which includes one or more examiners who are assumed to have some expertise in interpreting the references and to be familiar from their work with the level of skill in the art and whose duty it is to issue only valid patents.'" (quoting Am. Hoist & Derrick Co., 725 F.2d at 1359-60)). Moreover, the Court is required to give a certain level of deference to the PTO based on 35 U.S.C. § 282, which provides that a duly issued patent is presumed valid, and the Federal Circuit has recognized that such "statutory presumption derives in part from recognition of the technological expertise of the patent examiners." Interconnect Planning Corp., 774 F.2d at 1139.

Notwithstanding such presumption and the associated deference, when the validity of a patent is challenged in federal court, a district court has "the obligation . . . to reach an independent conclusion," regarding validity, and a prior decision by a patent examiner, whether it be on an

original patent application or a reissue application, "is never binding on the court.'" Id. (quoting Fromson v. Advance Offset Plate, Inc., 755 F.2d 1549, 1555 (Fed. Cir. 1985)). Rather, the examiner's decision is merely "evidence the court must consider in determining whether the party asserting invalidity has met its statutory burden by clear and convincing evidence.'" Id. (quoting Fromson, 755 F.2d at 1555).

In light of the fact that prior final PTO decisions affirming patentability are not controlling in a subsequent validity challenge in this Court, a decision by the PTO regarding whether to institute IPR certainly does not have binding effect on the Court. Moreover, even if the Court assumes that a prior final PTAB decision as to patentability, could somehow be binding on a district court, such rule surely would not make subsequent non-final PTAB decisions to institute, or not to institute IPR proceedings, retroactively binding on a district court. Accordingly, while the Court has the discretion to consider the recent PTAB rulings, they are not "controlling authority" reaching a decision contrary to this Court's decision, Sejman, 845 F.2d at 69, and the Court is therefore certainly not required to overturn its prior decision based on the analysis in a decision by the PTAB granting or denying institution of IPR.

B. Impact of Differing Standards at PTAB and the Court

The Court now moves on to consider the third and final Sejman factor, asking whether its "prior decision was clearly erroneous and would work manifest injustice." Sejman, 845 F.2d at 69. Any deference this Court might decide to accord PTAB analysis in determining whether the Court's prior decision was clearly erroneous and would work manifest injustice, such that it required reconsideration of the summary judgment Order, is tempered by the contrast between the claim constructions and other legal standards used by the PTAB and those used by this Court. In determining whether to institute IPR, the PTAB must determine whether, using the broadest reasonable interpretation of the claim terms, the petitioner has demonstrated that there is a reasonable likelihood of the patent claims being found invalid by a preponderance of the evidence. 37 C.F.R. § 42.100(b); 35 U.S.C. § 314(a); 35 U.S.C. § 316. In contrast, when construing a disputed patent's claim terms, the Court adopts a construction based on what a person having ordinary skill in the relevant art would understand the claims to mean as of the time of invention. Phillips v. AWH Corp., 415 F.3d 1303, 1313 (Fed. Cir. 2005). Once the claim terms have been construed, the Court determines whether the claims have been proven invalid by clear and convincing evidence. Microsoft Corp. v. i4i Ltd. P'ship, 131 S. Ct. 2238, 2246 (2011).

Indeed, the PTAB recognized these differing standards when it granted VIS's motion to submit to the PTAB this Court's January 8, 2014 summary judgment Order. The PTAB stated that "[a]lthough the district court's order may be informative, the Board applies a claim construction standard that may not be the same as that adopted by a district court, and the Board may reach a different result." Feb. 12, 2014 PTAB Order, Paper No. 12, Case Nos. IPR2013-00569, IPR2013-00570, IPR2013-00571; February 12, 2014 Order by PTAB, Paper No. 13, Case Nos. IPR2013-00572, IPR2013-00573. Thus, it is not surprising that in construing the specific claim term, "converted video signal," the term upon which VIS rests its entire argument for reconsideration, the PTAB reached a claim construction meaningfully different from the construction adopted by this Court in its Markman Opinion. Markman Opinion 52, ECF No. 198 (giving the term "converted video signal" its plain and ordinary meaning, which is "a video signal that has been changed."); Summary Judgment Order 17, ECF No. 413 (reaffirming the Court's construction of the term in its Markman Opinion); cf. Pl's Reconsideration Mem. Ex. 1 at 15, ECF No. 417-2 (reflecting the PTAB's definition of "convert" as "to change the representation of data from one form to another").¹¹

¹¹ Furthermore, VIS's attempt to argue that the claim constructions reached by the PTAB and the Court are consistent, Pl's Rebuttal Mem.

As the PTAB applied a different claim construction standard, and different standards of law, to reach its differing decision as to whether a specific prior art reference would likely disclose the claim limitation of a "converted video signal," VIS has failed to show that this Court's prior ruling on summary judgment was clearly erroneous or that it would work a manifest injustice if it is not revised. Sejman, 845 F.2d at 69; Franchot, 572 F.3d at 192 (quoting Aramony, 166 F.3d at 661).

Moreover, Plaintiff's attempt to get a second bite at the apple of invalidity, by arguing that this Court's earlier decision was clearly erroneous, undermines the principles of finality and comity on which the law of the case doctrine is grounded. The arguments and evidence presented to the PTAB, which were different than the arguments and evidence presented to this Court, necessarily informed the PTAB analysis and the conclusions which Plaintiff argues the Court should now adopt. However, the Court may not adopt the record presented to a

4, ECF No. 475, when they clearly are not, is merely an argument for a new claim construction in this case different from the construction which VIS argued for during the Markman process and which the Court subsequently adopted in its Markman Opinion. It is well-settled that "one cannot interpret a patent one way for the validity analysis and a different way for the infringement analysis." A. G. Design & Assocs. LLC v. Trainman Lantern Co., Inc., 271 F. App'x 995, 999 n.4 (Fed. Cir. 2008); see Amazon.com, Inc. v. Barnesandnoble.com, Inc., 239 F.3d 1343, 1351 (Fed. Cir. 2001) ("A patent may not, like a "nose of wax," be twisted one way to avoid anticipation and another to find infringement.") (quotation marks and citation omitted).

separate tribunal for the facts therein. See United States v. Jones, 29 F.3d 1549, 1553 (11th Cir. 1994) (recognizing that a "court may take judicial notice of a document filed in another court not for the truth of the matters asserted in the other litigation, but rather to establish the fact of such litigation and related filings." (quoting Liberty Mut. Ins. Co. v. Rotches Pork Packers, Inc., 969 F.2d 1384, 1388 (2d Cir. 1992)); United States v. Rosga, 864 F. Supp. 2d 439, 447 (E.D. Va. 2012) ("Thus, for example, a court may 'notic[e] the content of court records,' Colonial Penn Ins. Co. v. Coil, 887 F.2d 1236, 1239 (4th Cir. 1989), but 'only for the limited purpose of recognizing the "judicial act" that the order represents or the subject matter of the litigation.' Jones, 29 F.3d at 1553). Additionally, Plaintiff does not assert that the evidence presented to the PTAB by the parties to this litigation was unavailable at the time VIS filed its briefs on summary judgment regarding validity. Rather, Plaintiff only asserts that the PTAB had not yet rendered a decision favorable to VIS at the time it submitted its summary judgment briefs in this case. Pl's Reconsideration Mem. 2, ECF No. 417.

To allow reconsideration of an interlocutory order based upon the subsequent decision of another adjudicative tribunal – which was driven by a different claim construction, different arguments by the parties, different evidence, and a different

legal standard – would remove all considerations of finality and consistency by allowing parties to challenge a court's ruling whenever that party identifies, in hindsight, an improved legal argument. See Hilb Rogal & Hobbs Co., 2006 WL 5908727, at *8 ("Courts will not typically reconsider an interlocutory order where the motion to reconsider simply seeks 'to present a better and more compelling argument that the party could have presented in the original briefs.'" (quoting Madison River Mgmt. Co., 402 F. Supp. 2d at 619)); 18B Wright, Miller & Cooper, Federal Practice and Procedure: Jurisdiction § 4478.1 (2d ed. 2002) ("A trial court could not operate if it were to yield to every request to reconsider each of the multitude of rulings that may be made between filing and final judgment."); see also Sejman, 845 F.2d at 69 ("Clearly, courts could not perform their duties 'satisfactorily and efficiently . . . if a question once considered and decided . . . were to be litigated anew' in subsequent appeals. (quoting Great Western Tel. Co., 162 U.S. at 344)).

Finally, even if the Court reconsidered its prior summary judgment order in light of the PTAB's decisions regarding institution of IPR, the Court would arrive at the same conclusions. In its Markman Opinion, the Court adopted the construction of the term "converted video signal" proposed by VIS, and, based on what a person having ordinary skill in the

art would understand the claims to mean at the time of invention, gave the term its ordinary and plain meaning – “a video signal that has been changed.” Markman Opinion at 44 & 52, ECF No. 198. Therefore, when analyzing the asserted claims of the ‘268 patent for validity in light of the prior art reference “Palin,” the Court used this construction of the term “converted video signal.” In contrast to this Court’s claim construction, the PTAB applied the “broadest reasonable interpretation” standard to the differing evidence and argument before it and adopted a construction of the term “converted video signal” which defined “convert” as “to change the representation of data from one form to another, for example to change numerical data from binary to decimal or from cards to tape.” Pl.’s Reconsideration Mem., Ex. 1 at 15, ECF No. 417-1. Applying the construction adopted by this Court, and not the contrary construction adopted by the PTAB, the Court is confident that its decision in the original summary judgment Order was the correct one. The prior art reference “Palin” discloses a video signal which has been changed and, thus, anticipates the claim term of a “converted video signal.” See Summary Judgment Order at 29-30, ECF No. 413. That the PTAB arrived at a different conclusion when using a different claim construction does not serve to prove the Court’s conclusion

erroneous.¹²

For the reasons stated above, although this Court plainly has authority to reconsider the summary judgment Order, it declines to do so, based on considerations of finality, consistency, and comity, as well as the procedural posture of this case. Accordingly, Plaintiff's motion for reconsideration of the Court's summary judgment Order, ECF No. 416, is **DENIED**.

V. CONCLUSION

For the reasons stated above, Plaintiff's Motion for Reconsideration is **DENIED**. The Court reiterates for the benefit of counsel in this case, and counsel in all future patent cases, that a lawyer's general duty of candor to the Court requires counsel to timely notify the Court of requests to the PTO for institution of *inter partes* review when such request has the potential to affect the outcome of the concurrent litigation.

¹² The Court notes that Defendants separately opposed the motion for reconsideration through arguing that the motion was moot because none of the patent claims potentially affected by the PTAB's rulings are among those claims Plaintiff elected to assert at trial. Defs.' Opp. Mem. 13-14, ECF No. 465. While this is factually a true statement, it misses the potential indirect, but no less significant, impact that the instant motion could have on the trial, because some of the claims elected by VIS are dependent claims that rely on claims that were previously invalidated by this Court. Accordingly, as VIS correctly asserts, the reversal of such invalidation would necessarily impact the trial evidence Samsung would have to introduce in order to prove the invalidity of the dependent claim elected by VIS. Pl's Rebuttal Mem. 5, ECF No. 475. Thus, as the motion for reconsideration has the potential to impact the litigation of at least one of the claims Plaintiff has elected to assert at trial, the motion is not moot.

The Clerk is DIRECTED to send a copy of this Opinion and Order to all counsel of record.

IT IS SO ORDERED.

/s/ 

Mark S. Davis

UNITED STATES DISTRICT JUDGE

Norfolk, Virginia

May 21, 2014

UNITED STATES DISTRICT COURT
EASTERN DISTRICT OF VIRGINIA
Norfolk Division

VIRGINIA INNOVATION
SCIENCES, INC.,

Plaintiff,

v.

Case No.: 2:12cv548

SAMSUNG ELECTRONICS CO.,
LTD., ET AL.,

Defendants.

OPINION AND ORDER

Plaintiff, Virginia Innovation Sciences, Inc. ("Plaintiff" or "VIS"), asks this Court to reconsider its January 8, 2014 summary judgment Order granting, in part, the summary judgment motion of invalidity filed by defendants, Samsung Electronics Co., Ltd., Samsung Electronics America, Inc., and Samsung Telecommunications America, LLC (collectively "Samsung" or "Defendants"). ECF No. 416. Plaintiff asserts that new evidence justifies reconsideration of the summary judgment Order because, during the course of an *inter partes* review ("IPR") proceeding, the United States Patent and Trademark Office's ("PTO") Patent Trial and Appeal Board ("PTAB") issued preliminary decisions regarding institution of IPR on the patents-in-suit, with conclusions that are partially different

from this Court's summary judgment Order. The motion has been fully briefed and is therefore ripe for decision.¹

I. FACTUAL AND PROCEDURAL BACKGROUND

A. General Background

At issue in this case are five² patents: U.S. Patent No. 7,899,492 ("the '492 patent"), U.S. Patent No. 8,050,711 ("the '711 patent"), U.S. Patent No. 8,145,268 ("the '268 patent"), U.S. Patent No. 8,224,381 ("the '381 patent"), and U.S. Patent No. 8,135,398 ("the '398 patent"). All of the patents-in-suit are continuations or continuations-in-part of the '492 patent, titled "Methods, Systems and Apparatus for Displaying the Multimedia Information from Wireless Communication Networks." The patents-in-suit address the conversion of mobile terminal multimedia signals into a format for use by an alternative display, and each of the patents-in-suit describes inventions intended to resolve the inconvenience and impracticability of viewing multimedia content on the small screens of mobile terminals.

¹ On April 10, 2014, the Court held a hearing on the motion for reconsideration, but the hearing focused more on issues relating to the *inter partes* review, and its effect on pending district court proceedings, than the substance of the motion to reconsider. Hr'g Tr., ECF No. 554.

² Previously, there were six patents at issue in this case. However, U.S. Patent No. 7,957,733 ("the '733 patent") is no longer asserted as infringed. Agreed Dismissal Order, ECF No. 408.

In the instant patent infringement action, filed on October 4, 2012, 2:12cv548 (hereinafter "VIS I"), Plaintiff alleges that Defendants have directly, indirectly, and willfully infringed the patents-in-suit by making, using, offering for sale, selling, and/or importing a wide range of accused products, including smartphones, tablets, Blu-ray players, and hubs. Pl.'s Am. Compl., ECF No. 121. Samsung denies VIS's claims of infringement and asserts several affirmative defenses, including invalidity or unenforceability of all patents-in-suit, prosecution history estoppel, and other equitable doctrines. Additionally, Samsung asserts counterclaims seeking declarations of non-infringement, invalidity, and unenforceability for each of the patents-in-suit.

On June 14, 2013, three days after the Court conducted a Markman hearing, Plaintiff filed a second patent infringement action, 2:13cv332 (hereinafter "VIS II"), alleging essentially the same causes of action as in VIS I, but with respect to Defendants' newly released products. Case No. 2:13cv332, ECF No. 1. In response, Samsung asserted essentially the same defenses and counterclaims as in VIS I. By Order of October 25, 2013, the Court joined for trial VIS I and VIS II, as the matters involve the same parties and the same patents-in-suit. ECF. No. 353. The Court then issued a new scheduling Order for the joined cases, and rescheduled the November 12, 2013 trial to

April 21, 2014. Case No. 2:13cv332, ECF No. 63. Pursuant to that scheduling Order, the parties narrowed the issues for trial and Plaintiff made its final election of claims it would assert at trial, none of which is the subject of Plaintiff's motion for reconsideration. The April 21, 2014 trial of the two joined cases has been continued to May 27, 2014.

B. Summary Judgment and IPR

On August 13, 2013, Defendants filed a motion for summary judgment in this Court, seeking, among other things, a ruling of invalidity as to the patents-in-suit. On January 8, 2014, the Court ruled on Defendants' summary judgment motion in VIS I; granting, in part, and denying, in part, such motion. ECF No. 413. The Court found no willful infringement of any claims, and also found claims 21, 22, 25, 28, and 29 of the '268 patent, and claims 15, 60, 61 and 62 of the '398 patent, invalid as anticipated or obvious. *Id.* It is these findings of invalidity that Plaintiff asks the Court to reconsider, particularly the invalidity finding of claim 21 of the '268 patent as anticipated by prior art reference "Palin."

On September 5, 2013, at the same time VIS I and VIS II were proceeding before this Court, and while Defendant's summary judgment motion seeking a ruling of invalidity was pending, Defendants began parallel proceedings before the PTO directly challenging the validity of the patents-in-suit. Shortly

thereafter, on September 16, 2013, Defendants submitted to the PTO corrected petitions seeking IPR of 37 claims from the five patents-in-suit. Because the Director of the PTO has delegated the authority to institute IPR to the PTAB, the IPR petitions were submitted to the PTAB for consideration. Each of the claims that Defendants asked this Court to find invalid in their August 13, 2013 summary judgment motion of invalidity were included in the 37 claims that Defendants asked the three judge panel of the PTAB to find invalid in Defendants' September 16, 2013 IPR petitions.

Although the parties to this litigation notified the PTAB of the August 13, 2013 summary judgment motion pending before this Court, neither party advised this Court of the concurrent IPR petitions or requested a stay of Court proceedings pending a decision from the PTAB. Thus, on January 8, 2014, this Court issued its 72 page Opinion and Order ruling on the validity of the patents-in-suit without any knowledge that the exact same issues were the subject of an IPR petition pending before a three judge panel of the PTAB.

On March 6, 2014, the PTAB rendered its decisions regarding whether to instate IPR review of the five patents-in-suit, granting the request to review three of the patents ('268, '381, and '398), and denying the request to review two of the patents ('492 and '711). Pl.'s Reconsideration Mem., Exs. 1-5, ECF No.

417. Approximately one week later, the Court was finally apprised of the IPR proceedings when Plaintiff filed its motion for reconsideration of the Court's summary judgment ruling. ECF. No. 416. Plaintiff's brief in support of its motion highlights the substantive analysis included within the PTAB's decisions and argues that such rulings constitute "new evidence that was not available prior to this Court's Summary Judgment Order." Pl.'s Reconsideration Mem. 2, ECF No. 417. Moreover, Plaintiff argues that the PTAB's decisions should be afforded deference based on the PTAB's specialized knowledge and expertise. *Id.* at 4.

II. IPR AND THE DUTY OF CANDOR

Before addressing the motion to reconsider, the Court must address the IPR provisions of the Leahy-Smith America Invents Act ("AIA"), Pub. L. No. 112-29, 125 Stat. 284 (2011), codified at 35 U.S.C. §§ 311-319, and the impact of the IPR proceedings on the district court proceedings.

A. The IPR Procedure

The IPR procedure enacted by Congress in 2011 allows third parties to challenge a patent's validity by seeking IPR. "The IPR process set out in the AIA represents a 'new, more streamlined adjudicative proceeding' intended to replace the more cumbersome and time-consuming *inter partes* reexamination that could take upwards of three years to conclude." Rensselaer

Polytechnic Institute v. Apple Inc., No. 1:13cv633, 2014 U.S. Dist. LEXIS 5186, at *5 (N.D.N.Y. Jan. 15, 2014) (hereinafter "Rensselaer") (quoting Ultratec, Inc. v. Sorenson Commc'nns, Inc., No. 13-CV-346, 2013 U.S. Dist. LEXIS 162459, at *3 (W.D. Wisc. Nov. 14, 2013)); see Abbott Labs. v. Cordis Corp., 710 F.3d 1318, 1326 (Fed. Cir. 2013) (recognizing that the AIA changed the PTO's review process from "an examinational to an adjudicative proceeding") (emphasis added). IPR "is designed to improve upon the previous *inter partes* re-examination process by '(1) . . . reduc[ing] to 12 months the time the PTO spends reviewing validity, from the previous reexamination average of 36.2 months; (2) . . . minimiz[ing] duplicative efforts by increasing coordination between district court litigation and *inter partes* review; and (3) . . . allow[ing] limited discovery in the review proceedings.'" Automatic Mfg. Sys., Inc. v. Primera Technology, Inc., No. 6:12cv1727, 2013 U.S. Dist. LEXIS 165692, at *5 (M.D. Fla. November 21, 2013) (quoting Universal Elecs., Inc. v. Universal Remote Control, Inc., 943 F. Supp. 2d 1028, 1029-30 (C.D. Cal. 2013))³ (alteration in original)).

"Under the procedures governing IPR, which became effective on September 16, 2012, a request for review must be filed by the

³ In Universal Electronics, the Court's summary of the improvements resulting from the new IPR procedure relied on Changes to Implement Inter Partes Review Proceedings, Post-Grant Review Proceedings, and Transitional Program for Covered Business Method Patents, 77 Fed. Reg. 48,680 (Aug. 14, 2012) (codified at 37 C.F.R. §§ 42.100 et seq.).

petitioner within one year of being served with a complaint alleging infringement of the patent in issue." Rensselaer, 2014 U.S. Dist. LEXIS 5186, at *5 (citing 35 U.S.C. § 315(b)). "On *inter partes* review, a petitioner can challenge the validity of a patent only on grounds that could be raised under 35 U.S.C. § 102 (prior art) or 35 U.S.C. § 103 (obviousness), and only then 'on the basis of prior art consisting of patents or printed publications.'" Automatic Mfg. Sys., 2013 U.S. Dist. LEXIS 165692, at *5-6 (quoting 35 U.S.C. § 311(b)). "Once an IPR petition is filed, the patent owner may submit a preliminary response within three months, or may instead expedite the process by waiving the right to submit a preliminary response." Rensselaer, 2014 U.S. Dist. LEXIS 5186, at *6 (citing 35 U.S.C. § 313; 37 C.F.R. § 42.107(b)). "An IPR trial may be initiated by the PTO if the petitioner demonstrates a reasonable likelihood of prevailing with respect to at least one challenged claim." Id. at *7 (citing 35 U.S.C. § 314(a)). "The PTO must decide whether to institute IPR within three months of the filing of the preliminary response, or, if no response is filed, [within three months of] [] the last date on which a response may be filed." Evolutionary Intelligence LLC v. Yelp Inc., No. 13-CV-3587, 2013 U.S. Dist. LEXIS 178547, at *7 (N.D. Cal. Dec. 18, 2013) (citing 35 U.S.C. § 314(b)). "The Director [of the PTO], by regulation, has delegated to the [PTAB] the authority

under section 314 to decide whether to institute an *inter partes* review." St. Jude Medical, Cardiology Div., Inc. v. Volcano Corp., No. 2014-1183, 2014 U.S. App. LEXIS 7731, at *4 n.1 (Fed. Cir. Apr. 24, 2014) (citing 37 C.F.R. §§ 42.4 & 42.108). Accordingly, when the PTAB makes "the review-instituting decision, it is exercising the Director's section 314 authority." Id.

As the Rensselaer court noted, "[u]nlike the prior *inter partes* reexamination proceeding, which was accomplished largely through submissions before a PTO examiner, IPR under the AIA is conducted before a panel of three of the technically-trained administrative judges comprising the Patent Trial and Appeal Board ('PTAB')."Rensselaer, 2014 U.S. Dist. LEXIS 5186, at *7-8 (citing 35 U.S.C. § 6(a), (c)). "On review, [this PTAB three judge panel of] the PTO can invalidate any claim before it, and the petitioner is collaterally estopped from later asserting in a civil action 'that the claim is invalid on any ground that the petitioner raised or reasonably could have raised during that *inter partes* review.'" Automatic Mfg. Sys., 2013 U.S. Dist. LEXIS 165692, at *6 (citing 35 U.S.C. § 315(e)(2)). If the "IPR is initiated, the PTAB must issue a final determination within one year after commencement, although that period may be extended, for good cause, to eighteen months." Rensselaer, 2014 U.S. Dist. LEXIS 5186, at *8 (citing 35 U.S.C. § 316(a)(11)).

Any "party dissatisfied with the PTAB's final decision may appeal the determination to the Federal Circuit." Id. (citing 35 U.S.C. § 141). "Given this timeframe, IPR can take [up to] two years before the PTO, and an appeal to the Federal Circuit can extend that timeline further." Id. Of course, IPR can also take less than two years under these timeframes, and the preclusive effect of a PTAB final determination is triggered when the PTAB issues its final written decision - regardless of whether an appeal is taken to the Federal Circuit. Compare 35 U.S.C. §§ 315(e), 318, and 319 (triggering estoppel upon issuance of PTAB final determination on IPR), with Bettcher Indus., Inc. v. Bunzl USA Inc., 661 F.3d 629, 642-47 (Fed. Cir. 2011) (triggering estoppel when all court review of *inter partes* reexamination determination has been exhausted).

The impact of the new IPR procedure is only beginning to be experienced. Empirical data as of April 17, 2014 reflect that, in fiscal year 2013, there were 203 decisions issued by the PTAB regarding institution of *inter partes* review. Patent Trial and Appeal Board, AIA Progress, http://www.uspto.gov/ip/boards/bpai/stats/041714_aia_stat_graph.pdf. Of the 203, trials were instituted in 167, 10 were joined with existing proceedings, and 26 were denied - meaning that trial was instituted in approximately 87% of the cases. Id. Thus far in fiscal year 2014, there were 335 decisions issued by the PTAB regarding

institution of *inter partes* review. Id. Of the 335, trials were instituted in 267, 1 was joined with an existing proceeding, and 67 were denied - meaning that the percentage of trials instituted dropped somewhat to approximately 80%. Id.

B. Impact of IPR on District Court Litigation

A party simultaneously litigating a patent infringement case in federal court and an IPR proceeding before the PTAB must consider the impact of each proceeding on the other. For example, the AIA provides that "[i]f the petitioner or real party in interest files a civil action challenging the validity of a claim of the patent on or after the date on which the petitioner files a petition for *inter partes* review of the patent, that civil action will be automatically stayed until either the patent owner moves the court to lift the stay, the patent owner files a civil action or counterclaim alleging that the petitioner or real party in interest has infringed the patent, or the petitioner or real party in interest moves the court to dismiss the civil action." 60 Am. Jur. 2d Patents § 411 (2014) (citing 35 U.S.C. § 315(a)(2)). However, "[a] counterclaim challenging the validity of a claim of a patent does not constitute a civil action challenging the validity of a claim of a patent" within the meaning of 35 U.S.C. § 315(a)(2). Id. (citing 35 U.S.C. § 315(a)(3)). Therefore, when an IPR petition is filed by a party to district court patent

infringement litigation involving invalidity counterclaims, the AIA does not contain a mandatory provision requiring a stay of the district court patent infringement proceedings.⁴ Accordingly, the decision of whether to stay the district court proceedings in such a scenario is left to the district court's discretion - that is, if the district court knows about the IPR proceeding. See Proctor & Gamble Co. v. Kraft Foods Global, Inc., 549 F.3d 842, 848-49 (Fed. Cir. 2008) ("The Supreme Court has long recognized that district courts have broad discretion

⁴ When the AIA was introduced as H.R. 1249 in the House of Representatives, it contained a section 320, describing criteria a district court should use in deciding whether to grant a stay of such litigation. However, section 320 was later omitted by amendment before the AIA was adopted. Section 320 provided that: "If a party seeks a stay of a civil action alleging infringement of a patent under section 281, or a proceeding before the International Trade Commission under section 337 of the Tariff Act of 1930, relating to an inter partes review under this chapter, the court shall decide whether to enter a stay based on (1) whether a stay, or the denial thereof, will simplify the issues in question, and streamline the trial; (2) whether discovery is complete and whether a trial date has been set; (3) whether a stay, or the denial thereof, would unduly prejudice the non-moving party or present a clear tactical advantage for the moving party; and (4) whether a stay, or the denial thereof, will reduce the burden of litigation on the parties and on the court." H.R. Doc. No. 112-35 at 16 (2011). The omission of such provision from the final version of the statute means that a district court remains free to use its own discretion, and appropriate factors, in exercising its inherent power to grant or deny a stay. See Proctor & Gamble Co. v. Kraft Foods Global, Inc., 549 F.3d 842, 849 (Fed. Cir. 2008) (explaining that former 35 U.S.C. § 318 involving reexamination only supplemented the "inherent power of the district courts to grant a stay pending reexamination of a patent"); see also Cherokee Nation of Oklahoma v. United States, 124 F.3d 1413, 1416 (Fed. Cir. 1997) (describing balancing test for staying action); Peschke Map Techs., LLC v. J.J. Gumberg Co., Civ. Nos. 12-1525, 1527, 1528, 1530, 1572 & 1574, 2014 U.S. Dist. LEXIS 57113, at *5 (D. Del. Apr. 24, 2014) (granting stay pending PTAB inter partes review); ePlus, Inc. v. Lawson Software, Inc., No. 3:09cv620, 2010 U.S. Dist. LEXIS 31322, *5 (E.D. Va. Mar. 31, 2010) (applying stay standard in patent case involving patent reexamination).

to manage their dockets, including the power to grant a stay of proceedings.”).

Here, it seems obvious to this Court that VIS and Samsung should have notified the Court that IPR petitions were filed in September 2013, and that such IPR petitions addressed the same assertions of invalidity that were then being considered by the Court. However, because counsel for both parties assert that it never occurred to them that they had a duty to notify this Court, it is necessary to review such duty and remind counsel of their obligation to the Court with respect to such duty.⁵

⁵ During the April 10, 2014 hearing before this Court, Plaintiff stated that the failure to advise this Court of the pending PTAB proceeding was not intentional, and that counsel had never even discussed or considered whether they should advise the Court of the concurrent PTAB proceeding. Hr’g Tr. 7-8, ECF No. 554. In a post-hearing brief, VIS later stated that “Samsung raised its intention to file IPR requests when the parties met with Magistrate Judge Miller on August 29, 2013 for a settlement conference in VIS I.” ECF No. 558. The Court takes the parties at their word regarding their assertions that they did not intend to conceal such PTAB proceedings when they failed to advise this Court of the IPR. However, it must be noted that the discussions that occur during settlement conferences are confidential. In order to encourage the parties to enter into candid and fulsome discussions, the district judge and magistrate judge co-assigned to cases do not discuss the substance of such settlement conferences. This policy is reflected in the Settlement Conference Order entered by Judge Miller on July 24, 2013, which provides that “[t]he undersigned will not disclose the information received during the settlement conference to anyone without the permission of the party providing the information.” ECF No. 118. Moreover, E.D. Va. Loc. Civ. Rule 83.6(e) describes the rules governing mediation, including settlement conferences, and provides that “[t]he substance of communications in the mediation process shall not be disclosed to any person other than participants in the mediation process.”

1. Duty of Candor and Good Faith

This Court has adopted a local rule regarding the ethical standards applicable to cases before the Court. It provides that "[t]he ethical standards relating to the practice of law in civil cases in this Court shall be Section II of Part Six of the Rules of the Virginia Supreme Court as it may be amended or superseded from time to time." E.D. Va. Loc. Civ. R. 83.1. Rule 3.3 of those Rules of Professional Conduct is entitled "Candor Toward The Tribunal." Va. Rule Prof'l Conduct 3.3. Subsection (a)(2) of that Rule provides that "[a] lawyer shall not knowingly . . . fail to disclose a fact to a tribunal when disclosure is necessary to avoid assisting a criminal or fraudulent act by the client." *Id.* Comment 1 to the Rule observes that "[t]he advocate's task is to present the client's case with persuasive force. Performance of that duty while maintaining confidences of the client is qualified by the advocate's duty of candor to the tribunal." *Id.* Comment 3 to the Rule, entitled "Representations by a Lawyer," further provides that "[t]here are circumstances where failure to make a disclosure is the equivalent of an affirmative misrepresentation." *Id.* In addition to the Rule 3.3 duty of candor, there is also a broader general duty of candor and good faith that encompasses an attorney's duty to advise a district court of any development that may affect the outcome of the

litigation. United States v. Shaffer Equip. Co., 11 F.3d 450, 457-59 (4th Cir. 1993). These general principles, and the relationship between this general duty to advise and the Rule 3.3 duty of candor, have been discussed at length by the United States Court of Appeals for the Fourth Circuit.

In the following passage from Shaffer Equipment,⁶ the Fourth Circuit explained how these two duties apply:

It appears that the district court, in finding that the government's attorneys violated a duty of candor to the court, applied the general duty of candor imposed on all attorneys as officers of the court, as well as the duty of candor defined by Rule 3.3. Although the court referred to Rule 3.3, it also described the duty of candor more broadly as that duty attendant to the attorney's role as an officer of the court with a "continuing duty to inform the Court of any development which may conceivably affect the outcome of litigation." [United States v. Shaffer Equip. Co., 796 F. Supp. 938, 950 (S.D. W. Va. 1992).] It concluded, "Thus, attorneys are expected to bring directly before the Court all those conditions and circumstances which are relevant in a given case." Id. In its brief, the government did not address the existence, nature, and scope of any general duty of candor and whether its attorneys violated that duty. Nevertheless, we are confident that a general duty of candor to the court exists in connection with an attorney's role as an officer of the court.

Our adversary system for the resolution of disputes rests on the unshakable foundation that truth is the object of the system's process which is designed for

⁶ In Shaffer Equipment, the district court found that government attorneys breached their duty of candor in their efforts to recover the EPA's costs of cleaning up a hazardous waste site. The EPA on-site coordinator misrepresented his academic achievements and credentials and the government's attorneys wrongfully obstructed the defendants' efforts to "root out the discrepancies and failed to reveal them once they learned of them." 11 F.3d 450, 452.

the purpose of dispensing justice. However, because no one has an exclusive insight into truth, the process depends on the adversarial presentation of evidence, precedent and custom, and argument to reasoned conclusions--all directed with unwavering effort to what, in good faith, is believed to be true on matters material to the disposition. Even the slightest accommodation of deceit or a lack of candor in any material respect quickly erodes the validity of the process. As soon as the process falters in that respect, the people are then justified in abandoning support for the system in favor of one where honesty is preeminent.

While no one would want to disagree with these generalities about the obvious, it is important to reaffirm, on a general basis, the principle that lawyers, who serve as officers of the court, have the first line task of assuring the integrity of the process. Each lawyer undoubtedly has an important duty of confidentiality to his client and must surely advocate his client's position vigorously, but only if it is truth which the client seeks to advance. The system can provide no harbor for clever devices to divert the search, mislead opposing counsel or the court, or cover up that which is necessary for justice in the end. It is without note, therefore, that we recognize that the lawyer's duties to maintain the confidences of a client and advocate vigorously are trumped ultimately by a duty to guard against the corruption that justice will be dispensed on an act of deceit. See 1 Geoffrey C. Hazard, Jr. and W. William Hodes, *The Law of Lawyering* 575-76 (1990) ("Where there is danger that the tribunal will be misled, a litigating lawyer must forsake his client's immediate and narrow interests in favor of the interests of the administration of justice itself.").

While Rule 3.3 articulates the duty of candor to the tribunal as a necessary protection of the decision-making process, see Hazard at 575, and Rule 3.4 articulates an analogous duty to opposing lawyers, neither of these rules nor the entire Code of Professional Responsibility displaces the broader general duty of candor and good faith required to protect the integrity of the entire judicial process. The Supreme Court addressed this issue most recently

in Chambers v. NASCO, Inc., 501 U.S. 32, 115 L. Ed. 2d 27, 111 S. Ct. 2123 (1991). There, an attorney had taken steps to place certain property at issue beyond the jurisdiction of the district court and had filed numerous motions in bad faith, simply to delay the judicial process. The district court, the court of appeals, and the Supreme Court all agreed that neither Federal Rule of Civil Procedure 11 (subjecting to sanction anyone who signs a pleading in violation of the standards imposed by the rule) nor 28 U.S.C. § 1927 (subjecting to sanction anyone who "multiplies the proceedings . . . unreasonably and vexatiously") could reach the conduct. However, the Supreme Court accepted the district court's reliance on the inherent power to impose sanctions, rejecting arguments that Rule 11 and § 1927 reflect a legislative intent to displace a court's power to vacate a judgment upon proof that a fraud has been perpetrated upon the court:

We discern no basis for holding that the sanctioning scheme of the statute [28 U.S.C. § 1927] and the rules displaces the inherent power to impose sanctions for the bad faith conduct described above. These other mechanisms, taken alone or together, are not substitutes for the inherent power, for that power is both broader and narrower than other means of imposing sanctions. First, whereas each of the other mechanisms reaches only certain individuals or conduct, the inherent power extends to a full range of litigation abuses. At the very least, the inherent power must continue to exist to fill in the interstices.

[Chambers,] 501 U.S. at [46,] 111 S. Ct. at 2134 (emphasis added).

The general duty of candor and truth thus takes its shape from the larger object of preserving the integrity of the judicial system. For example, in Tiverton Board of License Commissioners v. Pastore, 469 U.S. 238, 83 L. Ed. 2d 618, 105 S. Ct. 685 (1985), counsel failed to apprise the Supreme Court that during the appeal process, one of the respondents, a liquor store challenging the admission of evidence at a Rhode Island liquor license revocation proceeding,

had gone out of business, rendering the case moot. Rebuking counsel for failing to comply with a duty of candor broader than Rule 3.3, the Supreme Court stated, "It is appropriate to remind counsel that they have a 'continuing duty to inform the Court of any development which may conceivably affect the outcome' of the litigation." Id. at 240 (quoting Fusari v. Steinberg, 419 U.S. 379, 391, 42 L. Ed. 2d 521, 95 S. Ct. 533 (1975) (Burger, C.J. concurring)) (emphasis added).

The general duty to preserve the integrity of the judicial process was similarly identified in Hazel-Atlas Glass Co. v. Hartford-Empire Co., 322 U.S. 238, 88 L. Ed. 1250, 64 S. Ct. 997 (1944). Without the support of any rule, the Court opened up a long-standing judgment because one of the litigants had introduced a document at trial which was later discovered to be fraudulent. The Supreme Court stated,

It is a wrong against the institutions set up to protect and safeguard the public, institutions in which fraud cannot complacently be tolerated consistently with the good order of society. Surely it cannot be that preservation of the integrity of the judicial process must always wait upon the diligence of litigants. The public welfare demands that the agencies of public justice be not so impotent that they must always be mute and helpless victims of deception and fraud.

Id. at 246 (emphasis added).

Shaffer Equip., Co., 11 F.3d at 457-59; see also Aptix Corp. v. Quickturn Design Sys., Inc., 269 F.3d 1369, 1379 (Fed. Cir. 2001) ("The duty of candor to the court is entitled to at least as much honor as that to the PTO.") (Mayer, C.J., dissenting).

2. Duty of Candor - Related Proceedings

This general and rule-based duty of candor finds application, among other places, in cases where two related matters are being adjudicated without counsel notifying each adjudicator of the related matter. A patent infringement suit with an invalidity counterclaim, and an IPR proceeding involving the validity of the same patent claims, fit into that category of related matters requiring notification to the respective adjudicative tribunals. At least one other court has found the duty of candor applicable in such circumstances. Rensselaer, 2014 U.S. Dist. LEXIS 5186, at *16. In Rensselaer, the district court explained that “[w]hile Apple filed its IPR petition on October 21, 2013, it was not until December 9, 2013, that it requested permission to bring the instant motion [to stay], which was filed on December 23, 2013.” Id. The court noted that in the interim, Apple had participated in a telephone conference with the court and “neglected to inform the court and plaintiffs that it had submitted an IPR petition to the PTO.” Id. The Rensselaer court also noted that, during a hearing on the motion to stay, “Apple did not offer a particularly persuasive reason for its lack of candor with the court and plaintiffs during the telephone conference regarding the fact that it had filed an IPR petition.” Id. (emphasis added).

In addition to such directly analogous case, federal courts in non-patent cases have long-recognized the existence of a duty of candor when related cases are simultaneously pending in different courts. In Cleveland Hair Clinic, Inc. v. Puig, 200 F.3d 1063, 1067-68 (7th Cir. 2000), an attorney appearing before a federal district court failed to disclose a state lawsuit he had prepared and was having simultaneously filed. Noting the Supreme Court's admonition that counsel have a continuing duty to inform the Court of any development which may conceivably affect the outcome of the litigation, Pastore, 469 U.S. at 240, and the Illinois Rule 3.3 duty of candor, the Seventh Circuit observed that "[t]he goal of the state lawsuit was to cut off the federal court at the pass, a development that surely could have affected the outcome of the litigation pending in federal court." Cleveland Hair Clinic, 200 F.3d at 1067-68.

In another case involving related litigation, Calleros v. FSI Int'l, Inc., 892 F. Supp. 2d 1163, 1165 (D. Minn. 2012), the plaintiff shareholder filed a suit in federal district court alleging that the defendant corporation, its officers, and directors, violated the Securities Exchange Act and their fiduciary duties by mailing incomplete and misleading disclosures in connection with a proposed tender offer by another company. However, the plaintiff shareholder failed to advise the district court that another shareholder had filed a

class-action suit in state court alleging that the same corporation's officers and directors violated their fiduciary duties by making incomplete and misleading disclosures in connection with the proposed transaction, and that two other similar state court class actions had also been filed. Id. at 1166. The district court noted that "[t]ellingly absent from [plaintiff's] Motion papers is any reference to the state-court cases raising nearly identical issues to the instant action." Id. at 1167. In deciding to stay its proceedings in favor of the related state court litigation, the district court observed that it was "troubled by the failure to mention the related state-court litigation," since "'[a]ttorneys, as officers of the court, have the responsibility to present the record with accuracy and candor.'" Id. at 1168 n.6 (quoting Pinkham v. Sara Lee Corp., 983 F.2d 824, 826 (8th Cir. 1992)). The district court concluded that "[i]t seems fairly apparent that counsel have flouted that obligation here." Id.; see also Perez v. Sanford-Orlando Kennel Club, Inc., 518 F.3d 1302, 1303 (11th Cir. 2008) (admonishing an attorney who failed to advise court of potentially jurisdiction-stripping events taking place before oral argument and then asking court to vacate opinion after losing his case).

This duty has also been applied in a non-patent context where there were federal district court proceedings and related

administrative proceedings pending at the same time. In U.S. Commodity Futures Trading Comm'n v. Lake Shore Asset Mgmt. Ltd., 540 F. Supp. 2d 994 (N.D. Ill. 2008) (hereinafter "Lake Shore"), the district court was faced with a situation involving a simultaneous administrative proceeding of which it was not informed. The district court, in a futures trading matter, had granted plaintiff's request for a statutory restraining order freezing defendant's assets, which order was later vacated by the Seventh Circuit's mandate. Id. at 996-97. "During this time period, unbeknownst to the court, the National Futures Association ("NFA"), which is not a party to this action, was working to freeze Lake Shore Ltd.'s assets via a completely different route by filing a member responsibility action ("MRA")." Id. at 997. Shortly after the Seventh Circuit vacated the district court's order, the NFA issued an asset freeze, which the district court learned of the same day when Lake Shore Ltd. filed an "emergency motion to enforce mandate." Id. The motion alleged that the federal statutorily-established NFA administrative action, which Lake Shore Ltd. had never previously mentioned to the district court or the Seventh Circuit, had been issued in violation of the Seventh Circuit's mandate and opinion. Id. The district court's opinion summarizing these events relied on both Cleveland Hair Clinic and Pastore in noting that it was "unclear why none of the

lawyers in this case told the court about the NFA member responsibility action prior to the issuance of the NFA asset freeze order, given that the preliminary injunction sought to freeze the very same assets at issue in the NFA action." *Id.* at 997 n.1.

3. Application of Duty of Candor to this Case

The context in which this Court learned of the related IPR litigation was slightly different from that in Rensselaer, and similar to that in Lake Shore, in that both VIS and Samsung knew of the September 2013 filing of the IPR petition, but neither of them informed the Court for six months. It was not until the PTAB ruled on institution, and VIS filed its motion to reconsider, that the Court was made aware of such concurrent proceeding. Of course, at the same time that Defendants were petitioning the PTAB for an adjudication of the validity of the patents at issue in this case, and Plaintiff was actively opposing such petitions, Defendants were also asking this Court to adjudicate the validity of the same patents and Plaintiff was actively opposing such efforts.

At the April 10, 2014 hearing before this Court on the motion to reconsider, the Court raised the issue of the parties' failure to notify the Court that they had begun the IPR proceeding. Hr'g Tr., ECF. No. 554. Counsel for each of the parties responded that it never occurred to them that they

should advise this Court of such parallel proceeding. Even after the Court noted that the AIA provides that, after a final written decision by the PTAB, a petitioner is collaterally estopped from later asserting in a civil action that the claim is invalid on any ground that the petitioner raised or reasonably could have raised during the *inter partes* review, Defendants seemed to suggest that they did not think to notify this Court of the IPR proceeding because this Court's docket moved so quickly. Hr'g Tr. 13, ECF No. 554.

The existence of such a parallel proceeding normally comes to the attention of the Court through one of the parties filing a motion to stay court proceedings in light the request for institution of IPR. See Universal Elecs., Inc., 943 F. Supp. 2d at 1030 (considering such a stay motion). However, that did not take place here. Had the parties promptly notified this Court of the pending petition, then the Court at least could have considered for itself what impact such related proceeding might have on the scheduling of matters,⁷ as well as whether it wished to stay the proceedings and its then-ongoing consideration of Defendants' summary judgment motion of invalidity. After all, "[a] stay is particularly appropriate, and within the court's 'sound discretion,' where the outcome of another case may

⁷ Had the Court known of the pending IPR proceeding on October 25, 2013, when it rescheduled the trial from November 12, 2013 to April 21, 2014, it could have factored such knowledge into its scheduling decision.

'substantially affect' or 'be dispositive of the issues' in a case pending before a district court." MEI, Inc. v. JCM Am. Corp., Civ. No. 09-351, 2009 U.S. Dist. LEXIS 96266, at *12-13 (D.N.J. Oct. 15, 2009) (quoting Bechtel Corp. v. Local 215, Laborers' Int'l Union of North America, 544 F.2d 1207, 1215 (3rd Cir. 1976)); see Brixham Solutions Ltd. v. Juniper Networks, Inc., Civ. No. 13-cv-616-JCS, 2014 U.S. Dist. LEXIS 58770, at *3-7 (N.D. Cal. April 28, 2014) (granting motion to stay patent infringement suit involving non-practicing entity pending *inter partes* review); see also Gould v. Control Laser Corp., 705 F.2d 1340, 1341 (Fed. Cir. 1983) (discussing trial court stay of patent infringement litigation during reexamination proceedings). Moreover, such stays may be initiated sua sponte. See Crown Cent. Petroleum Corp. v. Dep't of Energy, 102 F.R.D. 95, 98 (D. Md. 1984) ("A federal court has inherent power to stay, sua sponte, an action before it.") (citing Landis v. North Am. Co., 299 U.S. 248, 254-55 (1936)). And while, as Plaintiff has frequently noted, it is true that trials resolve cases, it is also true that a "final written decision" from the PTAB has preclusive effect and should therefore resolve cases. See 35 U.S.C. §§ 315(e), 318, and 319.

By failing to advise this Court of the existence of the IPR proceedings, VIS and Samsung in effect had two bites at the apple regarding the validity of the disputed claims. Moreover,

they deprived this Court of the opportunity to inquire of the parties and decide for itself whether to await a ruling from the PTAB on that issue. As the PTO noted in issuing its new rules of practice implementing the AIA, it was "anticipated that the rules will minimize duplication of efforts. . . . By requiring the filing of an *inter-partes* review petition earlier than a request for *inter-partes* reexamination, and by providing shorter timelines for *inter-partes* review compared with reexamination, it is anticipated that the current high level of duplication between litigation and reexamination will be reduced." 77 Fed. Reg. 48680, 48721. Needless to say, the practice adopted by the parties does not lend itself to promoting judicial efficiency or accomplishing some of the purposes Congress obviously intended with enactment of the AIA. Moreover, such practice may work a hardship on an entire district that seeks to expeditiously resolve its docket.

The parties should have notified this Court of the IPR petition as soon as it was filed, and the failure to do so appears, at least to the undersigned Judge, to have been a glaring omission. By not notifying the Court, counsel have, at the very least, failed to comply with their general duty of candor and good faith to this Court because the IPR proceeding was clearly a "development which may conceivably affect the outcome of the litigation" - a fact best demonstrated by

Plaintiff's filing of the motion for reconsideration. Pastore, 469 U.S. at 240.⁸ However, in light of the undeveloped state of the law on this relatively new PTO review procedure, this Court's admonition of all counsel involved in this case falls short of a formal reprimand of any of the individual lawyers.⁹ That said, the issuance of this Opinion is more than sufficient to place all patent practitioners on notice that future failures to disclose to the Court any concurrent *inter partes* review proceedings will be met with far sharper consequences.

Like the Lake Shore court, this Court "takes its obligation to promote civility and collegiality between the bench and bar very seriously," and only "prepared this opinion after a great deal of reflection." Lake Shore, 540 F. Supp. 2d at 996. However, the Court "cannot turn a blind eye to conduct that negatively impacts its ability to promote the orderly administration of justice and resolve disputes fairly." Id. It

⁸ In light of the Court's conclusion regarding the general duty of candor, it is not necessary for this Court to engage in further analysis regarding the Rule 3.3 duty of candor.

⁹ Although the replacement of *inter partes* reexamination by *inter partes* review effected a transformation from an examinational to an adjudicative proceeding, thus making the existence of concurrent PTO review proceedings more similar to the concurrent litigation cases discussed above, the prior reexamination process was still a related administrative proceeding that could "conceivably affect the outcome of the litigation." Pastore, 469 U.S. at 240. Accordingly, although the question is not squarely before this Court, there is a strong argument that even under the old *inter partes* reexamination process, the general duty of candor required parties to notify the Court of the filing of a petition for reexamination.

is this Court's hope that shining light on this issue will remind counsel in this case, and others, of their continuing duty to inform the Court of any development which may conceivably affect the outcome of the litigation. Pastore, 469 U.S. at 240. The Court now moves on to address the standard applicable to the motion to reconsider, as well as the substance of such motion.

III. STANDARD OF REVIEW - RECONSIDERATION

Because the motion for reconsideration is a procedural matter not unique to patent law, when considering such a motion, this Court looks to controlling Fourth Circuit precedent, rather than Federal Circuit precedent. Bowling v. Hasbro, 403 F.3d 1373, 1375 (Fed. Cir. 2005); Pennington Seed, Inc. v. Produce Exchange No. 299, 457 F.3d 1334, 1340 n.2 (Fed. Cir. 2006). Controlling Fourth Circuit law clearly provides that a summary judgment order, like the January 8, 2014 summary judgment Order at issue, "which did not resolve all claims against all parties, was interlocutory and thus subject to revision at any time." Saint Annes Dev. Co., Inc. v. Trabich, 443 F. App'x 829, 832 (4th Cir. 2011) (citing Fed. R. Civ. P. 54(b)). While final orders trigger heightened standards for reconsideration, see Fed. R. Civ. P. 59(e) and 60(b), interlocutory orders, such as orders of partial summary judgment, are not subject to those strict standards because "[a] district court retains the power

to reconsider and modify its interlocutory judgments, including partial summary judgments, at any time prior to final judgment when such is warranted.'" Saint Annes Dev. Co., 443 F. App'x at 832 (quoting American Canoe Ass'n v. Murphy Farms, Inc., 326 F.3d 505, 514-15 (4th Cir. 2003)); see Fed. R. Civ. P. 54(b) (providing that interlocutory orders that resolve fewer than all claims are "subject to revision at any time before the entry of [final] judgment"); Fayetteville Investors v. Commercial Builders, Inc., 936 F.2d 1462, 1469 (4th Cir. 1991) (same). The differing standards for interlocutory versus final orders are understandable, as significant time and resources are often invested in arriving at a final judgment. American Canoe Ass'n, 326 F.3d at 514.

The power to reconsider an interlocutory ruling "is committed to the discretion of the district court, . . . and doctrines such as law of the case . . . have evolved as a means of guiding that discretion." Id. at 515 (citing Moses H. Cone Mem. Hosp. v. Mercury Const. Corp., 460 U.S. 1, 12 (1983), Sejman v. Warner-Lambert Co., Inc., 845 F.2d 66, 69 (4th Cir. 1988)). A court's earlier decisions become law of the case and must generally be followed unless: "(1) a subsequent trial produces substantially different evidence, (2) controlling authority has since made a contrary decision of law applicable to the issue, or (3) the prior decision was clearly erroneous

and would work manifest injustice." Sejman, 845 F.2d at 69 (internal quotation marks omitted); see American Canoe Ass'n, 326 F.3d at 515 (explaining that although it is the "ultimate responsibility of [all levels of] the federal courts . . . to reach the correct judgment under law, . . . that obligation may be tempered at times by concerns of finality and judicial economy").

The law of the case doctrine, which guides this Court's reconsideration decision, "is not an 'inexorable command' but rather a prudent judicial response to the public policy favoring an end to litigation." Sejman, 845 F.2d at 68-69 (citations omitted). "As most commonly defined, the doctrine of the law of the case posits that when a court decides upon a rule of law, that decision should continue to govern the same issues in subsequent stages in the same case." Christianson v. Colt Indus. Operating Corp., 486 U.S. 800, 815-16 (1988) (internal citation and quotation marks omitted). The doctrine is "basically [a] simple principle of disciplined self-consistency" based on principles of finality and comity, as opposed to a lack of authority.¹⁰ 18B Wright, Miller & Cooper, Federal Practice

¹⁰ "The force of law-of-the-case doctrine is affected by the nature of the first ruling and by the nature of the issues involved. If the ruling is avowedly tentative or the issues especially important, it may be said that law-of-the-case principles do not apply. Different parties in separate proceedings likewise may fall outside law-of-the-case constraints Matters of fact, on the other hand, are unlikely candidates for reconsideration after the first full effort."

and Procedure: Jurisdiction § 4478 (2d ed. 2002). Stated differently, “[l]aw-of-the-case principles . . . are a matter of practice that rests on good sense and the desire to protect both court and parties against the burdens of repeated reargument by indefatigable diehards.” *Id.*; see Christianson, 486 U.S. at 816 n.5 (“Perpetual litigation of any issue . . . delays, and therefore threatens to deny, justice.”). It is a simple but unavoidable reality that district courts could not effectively and efficiently satisfy their responsibilities if every ruling were open to reconsideration based on better crafted legal argument. See Hilb Rogal & Hobbs Co. v. Rick Strategy Partners, Inc., No. 3:05cv355, 2006 WL 5908727, at *8 (E.D. Va. Feb. 10, 2006) (“Courts will not typically reconsider an interlocutory order where the motion to reconsider simply seeks ‘to present a better and more compelling argument than the party could have presented in the original briefs.’” (quoting Madison River Mgmt. Co. v. Business Mgmt. Software Corp., 402 F. Supp. 2d 617, 619 (M.D.N.C. 2005))); 18B Wright, Miller & Cooper, Federal Practice and Procedure: Jurisdiction § 4478.1 (2d ed. 2002) (“A trial court could not operate if it were to yield to every request to reconsider each of the multitude of rulings that may be made between filing and final judgment.”); see also Sejman, 845 F.2d

18B Wright, Miller & Cooper, Federal Practice and Procedure: Jurisdiction § 4478.5 (2d ed. 2002).

at 69 ("Clearly, courts could not perform their duties 'satisfactorily and efficiently . . . if a question once considered and decided . . . were to be litigated anew' in subsequent appeals. (quoting Great Western Tel. Co. v. Burnham, 162 U.S. 339, 344 (1896))).

Of course, "[a] court has the power to revisit prior decisions of its own or of a coordinate court in any circumstance, although as a rule courts should be loathe to do so in the absence of extraordinary circumstances such as where the initial decision 'was clearly erroneous and would work a manifest injustice.'" Christianson, 486 U.S. at 817 (quoting Arizona v. California, 460 U.S. 606, 618 n.8 (1983)). In line with Christianson, the Fourth Circuit has expressly recognized that a court may "depart[] from the law of the case when [a] previous decision [i]s 'clearly erroneous and would work manifest injustice.'" TFWS, Inc. v. Franchot, 572 F.3d 186, 192 (4th Cir. 2009) (quoting United States v. Aramony, 166 F.3d 655, 661 (4th Cir. 1999)). In applying such exception to the law of the case doctrine, the Fourth Circuit explained that "[a] prior decision does not qualify for this . . . exception by being just maybe or probably wrong; it must strike us as wrong with the force of a five-week-old, unrefrigerated dead fish." Id. at 194 (internal citations and quotation marks omitted). In other words, "[i]t must be 'dead wrong.'" Id. (citations omitted).

Accordingly, having determined that the above-described discretionary standard for reconsideration is the correct standard in the instant circumstances, the Court turns to the substantive analysis of the issues raised in the parties' briefs.

IV. DISCUSSION

Plaintiff's motion seeking reconsideration asserts that this Court should consider the recent PTAB decisions regarding institution to be "new evidence" and should give deference to the PTAB's findings due to the specialized knowledge and expertise of the PTO. Pl.'s Reconsideration Mem. 4, ECF No. 417 (citing PowerOasis, Inc. v. T-Mobile USA, Inc., 522 F.3d 1299, 1304 (Fed. Cir. 2008)). Defendants respond by arguing that the Court need not accord the decisions by the PTAB deference because "a decision by the USPTO that claims are valid over prior art is 'never binding on the court.'" Defs.' Opp. Mem. 7, ECF No. 465 (quoting Interconnect Planning Corp. v. Feil, 774 F. Supp. 2d 1132, 1139 (Fed. Cir. 1985) (emphasis added by Defendants)). Defendants further assert that no deference should be accorded the PTAB's decisions because they are only decisions regarding whether to institute IPR, not final decisions after PTAB adjudication. Moreover, Samsung argues that even these preliminary decisions to institute IPR, or not to institute IPR, are initial rulings subject to rehearing. Id. at 7-8. VIS

replies by asserting that its position is not that the PTAB rulings are binding on this Court, but that they should be afforded deference as a matter of law. Pl's Rebuttal Mem. 2, ECF No. 475 (citing Am. Hoist & Derrick Co. v. Sowa & Sons, Inc., 725 F.2d 1350, 1359 (Fed. Cir. 1986) abrogated on other grounds by Therasense, Inc. v. Becton, Dickinson & Co., 649 F.3d 1276, 1288-90 (Fed. Cir. 2011) (en banc)).

These assertions by Plaintiff seem to rely on the first two Sejman factors that our Court of Appeals directs district courts to utilize in deciding whether to reconsider an interlocutory ruling. Sejman, 845 F.2d at 69. However, the first of the three Sejman factors described above is not present in this case because no "subsequent trial produce[d] substantially different evidence" such that this Court should not follow its earlier decision. Id. No trial has taken place in this case. See Lincoln Nat'l Life Ins. Co. v. Roosth, 306 F.2d 110, 113 (5th Cir. 1962) (clearly referencing subsequent trial in same case as original decision in describing factor Sejman adopted). Therefore, there is no different evidence produced by "a trial" in this case. Moreover, even if the Court were to broadly construe the submission to the Court of the PTAB decisions as falling within the ambit of the first Sejman factor, such PTAB decisions still do not satisfy the first factor. As discussed more fully below, a decision on IPR institution is merely a

threshold determination as to whether, using the broadest reasonable interpretation of the claim terms, the petitioner has demonstrated that there is a reasonable likelihood of the patent claims being found invalid by a preponderance of the evidence. 37 C.F.R. § 542.100(b); 35 U.S.C. § 314(a); 35 U.S.C. § 316. As such, it is not a "trial" producing "evidence."

A. Deference Owed to PTAB's Decisions

Having determined that there is no subsequent trial producing substantially different evidence, the Court moves on to the second Sejman factor, and asks whether controlling authority has since made a contrary decision of law applicable to the issue at hand, such that the Court should not follow its earlier decision. Sejman, 845 F.2d at 69. PTO decisions regarding patentability can have a direct effect on pending litigation because the power to grant a patent is not one afforded to the courts, but is strictly within the domain of the PTO. See Patlex Corp. v. Mossinghoff, 758 F.2d 594, 604 on reh'g, 771 F.2d 480 (Fed. Cir. 1985) ("Validity often is brought into question in disputes between private parties, but the threshold question usually is whether the PTO, under the authority assigned to it by Congress, properly granted the patent. At issue is a right that can only be conferred by the government." (citing Crowell v. Benson, 285 U.S. 22, 50 (1932))). The Court therefore generally gives deference to

final PTO decisions, based in part on the PTO's specialized knowledge and expertise. See PowerOasis, Inc., 522 F.3d at 1304 (indicating that when the validity of an issued patent is challenged, and "'no prior art other than that which was [originally] considered by the PTO examiner is relied on by the attacker, he has the added burden of overcoming the deference that is due to a qualified government agency presumed to have properly done its job, which includes one or more examiners who are assumed to have some expertise in interpreting the references and to be familiar from their work with the level of skill in the art and whose duty it is to issue only valid patents.'" (quoting Am. Hoist & Derrick Co., 725 F.2d at 1359-60)). Moreover, the Court is required to give a certain level of deference to the PTO based on 35 U.S.C. § 282, which provides that a duly issued patent is presumed valid, and the Federal Circuit has recognized that such "statutory presumption derives in part from recognition of the technological expertise of the patent examiners." Interconnect Planning Corp., 774 F.2d at 1139.

Notwithstanding such presumption and the associated deference, when the validity of a patent is challenged in federal court, a district court has "the obligation . . . to reach an independent conclusion," regarding validity, and a prior decision by a patent examiner, whether it be on an

original patent application or a reissue application, "is never binding on the court.'" *Id.* (quoting Fromson v. Advance Offset Plate, Inc., 755 F.2d 1549, 1555 (Fed. Cir. 1985)). Rather, the examiner's decision is merely "evidence the court must consider in determining whether the party asserting invalidity has met its statutory burden by clear and convincing evidence.'" *Id.* (quoting Fromson, 755 F.2d at 1555).

In light of the fact that prior final PTO decisions affirming patentability are not controlling in a subsequent validity challenge in this Court, a decision by the PTO regarding whether to institute IPR certainly does not have binding effect on the Court. Moreover, even if the Court assumes that a prior final PTAB decision as to patentability, could somehow be binding on a district court, such rule surely would not make subsequent non-final PTAB decisions to institute, or not to institute IPR proceedings, retroactively binding on a district court. Accordingly, while the Court has the discretion to consider the recent PTAB rulings, they are not "controlling authority" reaching a decision contrary to this Court's decision, Sejman, 845 F.2d at 69, and the Court is therefore certainly not required to overturn its prior decision based on the analysis in a decision by the PTAB granting or denying institution of IPR.

B. Impact of Differing Standards at PTAB and the Court

The Court now moves on to consider the third and final Sejman factor, asking whether its "prior decision was clearly erroneous and would work manifest injustice." Sejman, 845 F.2d at 69. Any deference this Court might decide to accord PTAB analysis in determining whether the Court's prior decision was clearly erroneous and would work manifest injustice, such that it required reconsideration of the summary judgment Order, is tempered by the contrast between the claim constructions and other legal standards used by the PTAB and those used by this Court. In determining whether to institute IPR, the PTAB must determine whether, using the broadest reasonable interpretation of the claim terms, the petitioner has demonstrated that there is a reasonable likelihood of the patent claims being found invalid by a preponderance of the evidence. 37 C.F.R. § 42.100(b); 35 U.S.C. § 314(a); 35 U.S.C. § 316. In contrast, when construing a disputed patent's claim terms, the Court adopts a construction based on what a person having ordinary skill in the relevant art would understand the claims to mean as of the time of invention. Phillips v. AWH Corp., 415 F.3d 1303, 1313 (Fed. Cir. 2005). Once the claim terms have been construed, the Court determines whether the claims have been proven invalid by clear and convincing evidence. Microsoft Corp. v. i4i Ltd. P'ship, 131 S. Ct. 2238, 2246 (2011).

Indeed, the PTAB recognized these differing standards when it granted VIS's motion to submit to the PTAB this Court's January 8, 2014 summary judgment Order. The PTAB stated that "[a]lthough the district court's order may be informative, the Board applies a claim construction standard that may not be the same as that adopted by a district court, and the Board may reach a different result." Feb. 12, 2014 PTAB Order, Paper No. 12, Case Nos. IPR2013-00569, IPR2013-00570, IPR2013-00571; February 12, 2014 Order by PTAB, Paper No. 13, Case Nos. IPR2013-00572, IPR2013-00573. Thus, it is not surprising that in construing the specific claim term, "converted video signal," the term upon which VIS rests its entire argument for reconsideration, the PTAB reached a claim construction meaningfully different from the construction adopted by this Court in its Markman Opinion. Markman Opinion 52, ECF No. 198 (giving the term "converted video signal" its plain and ordinary meaning, which is "a video signal that has been changed."); Summary Judgment Order 17, ECF No. 413 (reaffirming the Court's construction of the term in its Markman Opinion); cf. Pl's Reconsideration Mem. Ex. 1 at 15, ECF No. 417-2 (reflecting the PTAB's definition of "convert" as "to change the representation of data from one form to another").¹¹

¹¹ Furthermore, VIS's attempt to argue that the claim constructions reached by the PTAB and the Court are consistent, Pl's Rebuttal Mem.

As the PTAB applied a different claim construction standard, and different standards of law, to reach its differing decision as to whether a specific prior art reference would likely disclose the claim limitation of a "converted video signal," VIS has failed to show that this Court's prior ruling on summary judgment was clearly erroneous or that it would work a manifest injustice if it is not revised. Sejman, 845 F.2d at 69; Franchot, 572 F.3d at 192 (quoting Aramony, 166 F.3d at 661).

Moreover, Plaintiff's attempt to get a second bite at the apple of invalidity, by arguing that this Court's earlier decision was clearly erroneous, undermines the principles of finality and comity on which the law of the case doctrine is grounded. The arguments and evidence presented to the PTAB, which were different than the arguments and evidence presented to this Court, necessarily informed the PTAB analysis and the conclusions which Plaintiff argues the Court should now adopt. However, the Court may not adopt the record presented to a

4, ECF No. 475, when they clearly are not, is merely an argument for a new claim construction in this case different from the construction which VIS argued for during the Markman process and which the Court subsequently adopted in its Markman Opinion. It is well-settled that "one cannot interpret a patent one way for the validity analysis and a different way for the infringement analysis." A. G. Design & Assocs. LLC v. Trainman Lantern Co., Inc., 271 F. App'x 995, 999 n.4 (Fed. Cir. 2008); see Amazon.com, Inc. v. Barnesandnoble.com, Inc., 239 F.3d 1343, 1351 (Fed. Cir. 2001) ("A patent may not, like a "nose of wax," be twisted one way to avoid anticipation and another to find infringement.") (quotation marks and citation omitted).

separate tribunal for the facts therein. See United States v. Jones, 29 F.3d 1549, 1553 (11th Cir. 1994) (recognizing that a "court may take judicial notice of a document filed in another court not for the truth of the matters asserted in the other litigation, but rather to establish the fact of such litigation and related filings." (quoting Liberty Mut. Ins. Co. v. Rotches Pork Packers, Inc., 969 F.2d 1384, 1388 (2d Cir. 1992)); United States v. Rosga, 864 F. Supp. 2d 439, 447 (E.D. Va. 2012) ("Thus, for example, a court may 'notic[e] the content of court records,' Colonial Penn Ins. Co. v. Coil, 887 F.2d 1236, 1239 (4th Cir. 1989), but 'only for the limited purpose of recognizing the "judicial act" that the order represents or the subject matter of the litigation.' Jones, 29 F.3d at 1553). Additionally, Plaintiff does not assert that the evidence presented to the PTAB by the parties to this litigation was unavailable at the time VIS filed its briefs on summary judgment regarding validity. Rather, Plaintiff only asserts that the PTAB had not yet rendered a decision favorable to VIS at the time it submitted its summary judgment briefs in this case. Pl's Reconsideration Mem. 2, ECF No. 417.

To allow reconsideration of an interlocutory order based upon the subsequent decision of another adjudicative tribunal – which was driven by a different claim construction, different arguments by the parties, different evidence, and a different

legal standard – would remove all considerations of finality and consistency by allowing parties to challenge a court's ruling whenever that party identifies, in hindsight, an improved legal argument. See Hilb Rogal & Hobbs Co., 2006 WL 5908727, at *8 ("Courts will not typically reconsider an interlocutory order where the motion to reconsider simply seeks 'to present a better and more compelling argument that the party could have presented in the original briefs.'" (quoting Madison River Mgmt. Co., 402 F. Supp. 2d at 619)); 18B Wright, Miller & Cooper, Federal Practice and Procedure: Jurisdiction § 4478.1 (2d ed. 2002) ("A trial court could not operate if it were to yield to every request to reconsider each of the multitude of rulings that may be made between filing and final judgment."); see also Sejman, 845 F.2d at 69 ("Clearly, courts could not perform their duties 'satisfactorily and efficiently . . . if a question once considered and decided . . . were to be litigated anew' in subsequent appeals. (quoting Great Western Tel. Co., 162 U.S. at 344)).

Finally, even if the Court reconsidered its prior summary judgment order in light of the PTAB's decisions regarding institution of IPR, the Court would arrive at the same conclusions. In its Markman Opinion, the Court adopted the construction of the term "converted video signal" proposed by VIS, and, based on what a person having ordinary skill in the

art would understand the claims to mean at the time of invention, gave the term its ordinary and plain meaning – “a video signal that has been changed.” Markman Opinion at 44 & 52, ECF No. 198. Therefore, when analyzing the asserted claims of the ‘268 patent for validity in light of the prior art reference “Palin,” the Court used this construction of the term “converted video signal.” In contrast to this Court’s claim construction, the PTAB applied the “broadest reasonable interpretation” standard to the differing evidence and argument before it and adopted a construction of the term “converted video signal” which defined “convert” as “to change the representation of data from one form to another, for example to change numerical data from binary to decimal or from cards to tape.” Pl.’s Reconsideration Mem., Ex. 1 at 15, ECF No. 417-1. Applying the construction adopted by this Court, and not the contrary construction adopted by the PTAB, the Court is confident that its decision in the original summary judgment Order was the correct one. The prior art reference “Palin” discloses a video signal which has been changed and, thus, anticipates the claim term of a “converted video signal.” See Summary Judgment Order at 29-30, ECF No. 413. That the PTAB arrived at a different conclusion when using a different claim construction does not serve to prove the Court’s conclusion

erroneous.¹²

For the reasons stated above, although this Court plainly has authority to reconsider the summary judgment Order, it declines to do so, based on considerations of finality, consistency, and comity, as well as the procedural posture of this case. Accordingly, Plaintiff's motion for reconsideration of the Court's summary judgment Order, ECF No. 416, is **DENIED**.

V. CONCLUSION

For the reasons stated above, Plaintiff's Motion for Reconsideration is **DENIED**. The Court reiterates for the benefit of counsel in this case, and counsel in all future patent cases, that a lawyer's general duty of candor to the Court requires counsel to timely notify the Court of requests to the PTO for institution of *inter partes* review when such request has the potential to affect the outcome of the concurrent litigation.

¹² The Court notes that Defendants separately opposed the motion for reconsideration through arguing that the motion was moot because none of the patent claims potentially affected by the PTAB's rulings are among those claims Plaintiff elected to assert at trial. Defs.' Opp. Mem. 13-14, ECF No. 465. While this is factually a true statement, it misses the potential indirect, but no less significant, impact that the instant motion could have on the trial, because some of the claims elected by VIS are dependent claims that rely on claims that were previously invalidated by this Court. Accordingly, as VIS correctly asserts, the reversal of such invalidation would necessarily impact the trial evidence Samsung would have to introduce in order to prove the invalidity of the dependent claim elected by VIS. Pl's Rebuttal Mem. 5, ECF No. 475. Thus, as the motion for reconsideration has the potential to impact the litigation of at least one of the claims Plaintiff has elected to assert at trial, the motion is not moot.

The Clerk is DIRECTED to send a copy of this Opinion and Order to all counsel of record.

IT IS SO ORDERED.

/s/ 

Mark S. Davis

UNITED STATES DISTRICT JUDGE

Norfolk, Virginia

May 2, 2014

**IN THE UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF VIRGINIA
NORFOLK DIVISION**

VIRGINIA INNOVATION
SCIENCES, INC.,

Plaintiff,

v.

SAMSUNG ELECTRONICS. CO., LTD,
SAMSUNG ELECTRONICS AMERICA,
INC., AND SAMSUNG
TELECOMMUNICATIONS AMERICA,
LLC,

Defendants.

CIVIL ACTION NOS.
2:12-cv-00548-MSD-TEM
2:13-cv-00332-MSD-TEM

STIPULATED FINAL JUDGMENT

In the Court's April 11, 2014 Opinion and Order (VIS II, ECF No. 250) on Defendants' Motion for Partial Summary Judgment (VIS II, ECF No. 85) and Order (VIS I, ECF No. 557) on Defendants' Motion in Limine No. 11 (VIS I, ECF No. 443 and VIS II, ECF No. 149), the Court made the following rulings:

- (a) “Under a literal infringement theory, the accused MHL-enabled products in VIS II do not directly infringe the asserted claims of the ’268, ’381, and ’398 patents” because they do not include an HDMI output from the mobile terminal;
 - (b) “a finding under the doctrine of equivalents that MHL is equivalent to HDMI would essentially render the HDMI limitation meaningless and would vitiate the limitation” in the asserted claims of the ’268, ’381, and ’398 patents;

- (c) Plaintiff failed to timely present a theory of infringement under the doctrine of equivalents in VIS I under Fed. R. Civ. P. 26;
- (d) Plaintiff is precluded from arguing that the accused smartphones in VIS I infringe the asserted claims of '268 Patent, the '381 Patent, and the '398 Patent under the doctrine of equivalents;
- (e) "a reasonable fact finder could not find MHL to be an equivalent to HDMI in the output interface limitations" of those claims;
- (f) "any conversion to a display format, i.e. an uncompressed format, must occur prior to its transmission from the mobile terminal to the alternative display via an output interface. Thus, a format which requires not just decoding, but deconstruction and reassembly after it is received by the alternative display is not a 'display format'";
- (g) "when the MHL signal arrives at the alternative display, the previously interleaved segments of data must be deconstructed and reassembled into the original four channels of data, and the clock channel must be divided by a factor of three, before the data can be displayed"; and
- (h) "no reasonable jury could find that MHL constitutes a 'display format,' as HDMI does" (ECF No. 250).

On April 29, 2014, Plaintiff and Defendants made the following stipulations:

- (a) The Court's Summary Judgment Order found that the accused MHL-enabled products of VIS II do not directly infringe the asserted claims of the '268, '381, and '398 Patents, either literally or under the doctrine of equivalents;
- (b) Pursuant to the Court's determination that MHL is not an equivalent of HDMI, the MHL-enabled accused products in VIS II also cannot indirectly infringe the asserted claims of the

'268, '381 and '398 Patents when used in conjunction with an intermediate device because conversion to HDMI does not occur prior to transmission from the mobile terminal;

(c) The Court's Summary Judgment Order found that the accused MHL-enabled products of VIS II do not directly infringe the asserted claims of the '492, '711, and '268 Patents;

(d) Pursuant to the Court's determination that MHL is not a "display format," even drawing the inference in VIS's favor that HDMI is a display format, the MHL-enabled accused products cannot infringe the asserted claims of the '492, '711, and '268 Patents when used in conjunction with an intermediate device because conversion to a "display format" does not occur prior to transmission from the mobile terminal;

(e) Although the Court's Summary Judgment Opinion and Order (VIS II, ECF No. 250) addressed only accused products in VIS II, the accused products in VIS I cannot infringe the asserted claims for the same reasons;

(f) Plaintiff hereby dismisses without prejudice its claims against Samsung's Droid Charge as an accused product, and that product should be deleted from paragraph 37 of the Court's Amended Final Pretrial Order, which was entered on April 14, 2014. VIS I, ECF No. 560 at 4. As a result, all remaining accused products are either MHL-enabled, or are intermediate devices, and therefore governed by the Court's Summary Judgment Opinion and Order, and Plaintiff is precluded from offering evidence of infringement on any accused product remaining in either VIS I or VIS II;

(g) Defendants dismiss without prejudice their respective counterclaims for declaratory judgment of invalidity and unenforceability; and

(h) Defendants will not move for costs and attorneys' fees, if at all, until after resolution of the contemplated appeal, or within thirty (30) days following the deadline for filing a notice of appeal, whichever is later.

(VIS I, ECF No. 567; VIS II, ECF No. 267). These stipulations were to facilitate the immediate appeal of the Court's Final Judgment. Defendants contend that there are additional grounds for non-infringement and invalidity of all the asserted claims that are not addressed in the Court's summary judgment orders or as part of invalidity proceedings currently pending before the Patent & Trademark Office, and reserve their right to assert such additional grounds in the event that the appellate court remands the case to the District Court. Plaintiff agrees not to assert that the stipulations and corresponding appeal constitute grounds for challenging these defenses as waived in such a remand proceeding.

On April 15, 2014, the Parties indicated they were working to resolve the matter in a way that would not necessitate a trial, and the Court continued trial to May 27, 2014. (VIS I, ECF No. 566; VIS II, ECF No. 261.)

In accordance with the above, the Court hereby enters Final Judgment in this matter as follows:

1. **FINAL JUDGMENT** with respect to Plaintiff's claims of infringement of the '492 Patent against Defendants is entered against Plaintiff and in favor of Defendants, and Plaintiff shall take nothing of and from its claims of infringement of the '492 Patent against Defendants. All of Defendants counterclaims are **DISMISSED WITHOUT PREJUDICE**, without waiving Defendants' right to reassert any or all of these claims in this action or another, including but not limited to in the event that the appellate court remands the case to the District Court.

2. **FINAL JUDGMENT** with respect to Plaintiff's claims of infringement of the '711 Patent against Defendants is entered against Plaintiff and in favor of Defendants, and Plaintiff shall take nothing of and from its claims of infringement of the '711 Patent against Defendants. All of Defendants counterclaims are **DISMISSED WITHOUT PREJUDICE**, without waving Defendants' right to reassert any or all of these claims in this action or another, including but not limited to in the event that the appellate court remands the case to the District Court.
3. **FINAL JUDGMENT** with respect to Plaintiff's claims of infringement of the '268 Patent against Defendants is entered against Plaintiff and in favor of Defendants, and Plaintiff shall take nothing of and from its claims of infringement of the '268 Patent against Defendants. All of Defendants counterclaims are **DISMISSED WITHOUT PREJUDICE**, without waving Defendants' right to reassert any or all of these claims in this action or another, including but not limited to in the event that the appellate court remands the case to the District Court.
4. **FINAL JUDGMENT** with respect to Plaintiff's claims of infringement of the '381 Patent against Defendants is entered against Plaintiff and in favor of Defendants, and Plaintiff shall take nothing of and from its claims of infringement of the '381 Patent against Defendants. All of Defendants counterclaims are **DISMISSED WITHOUT PREJUDICE**, without waving Defendants' right to reassert any or all of these claims in this action or another, including but not limited to in the event that the appellate court remands the case to the District Court.
5. **FINAL JUDGMENT** with respect to Plaintiff's claims of infringement of the '398 Patent against Defendants is entered against Plaintiff and in favor of Defendants, and Plaintiff

shall take nothing of and from its claims of infringement of the '398 Patent against Defendants. All of Defendants' counterclaims are **DISMISSED WITHOUT PREJUDICE**, without waiving Defendants' right to reassert any or all of these claims in this action or another, including but not limited to in the event that the appellate court remands the case to the District Court.

6. The deadline for the parties to seek recovery of costs (including filing a Notice of Application and proposed Bill of Costs) and/or attorney's fees is extended to thirty (30) days following issuance of a mandate in any appeal from this Final Judgment. To the extent no such appeal is filed, the deadline shall be thirty (30) days following the deadline for filing a notice of appeal.
7. Subject to paragraph 6, all claims between the parties have now been resolved. This is a **FINAL AND APPEALABLE JUDGMENT.**

IT IS SO ORDERED.

May 5, 2014
Norfolk, Virginia


Mark S. Davis
United States District Judge

Mark S. Davis
UNITED STATES DISTRICT JUDGE

By:



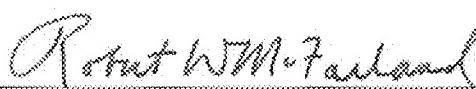
W. Ryan Snow, VSB No. 47423
David C. Hartnett, VSB No. 80452
CRENSHAW, WARE & MARTIN, P.L.C.
150 West Main Street, Suite 1500
Norfolk, Virginia 23510
Telephone: (757) 623-3000
Facsimile: (757) 623-5735
wrsnow@cwm-law.com
dhartnett@cwm-law.com

Edward E. Casto, Jr., Esq. (*pro hac vice*)
Edward R. Nelson, III, Esq. (*pro hac vice*)
Thomas C. Cecil, Esq. (*pro hac vice*)
Jonathan H. Rastegar, Esq. (*pro hac vice*)
Anthony Vecchione, Esq. (*pro hac vice*)
NELSON BUMGARDNER CASTO, P.C.
3131 West 7th Street, Suite 300
Fort Worth, Texas 76107
Telephone: (817) 377-9111
Facsimile: (817) 377-3485
enelson@nbclaw.net
ecasto@nbclaw.net
tcecil@nbclaw.net
jrastegar@nbclaw.net

Timothy E. Grochoinski, Esq. (*pro hac vice*)
INNOVALAW, P.C.
1900 Ravinia Place
Orland Park, Illinois 60462
Telephone: (708) 675-1975
teg@innovalaw.com

Counsel for Virginia Innovation Sciences, Inc.

By:



Robert W. McFarland, VSB No. 24021
rmcfarland@mcguirewoods.com
Sarah K. McConaughy, VSB No. 80674
smeconaughy@mcguirewoods.com
MC GUIRE WOODS LLP
World Trade Center
101 West Main Street, Suite 9000
Norfolk, Virginia 23510-1655
Telephone: (757) 640-3716
Facsimile: (757) 640-3966

Brett J. Williamson (*pro hac vice*)
bwilliamson@omm.com
O'MELVENY & MYERS LLP
610 Newport Center Drive, 17th Floor
Newport Beach, California 92660-6429
Telephone: (949) 760-9600
Facsimile: (949) 823-6994

Counsel for Defendants Samsung
Electronics Co., Ltd., Samsung Electronics
America, Inc., and Samsung
Telecommunications America, LLC

**IN THE UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF VIRGINIA
NORFOLK DIVISION**

VIRGINIA INNOVATION SCIENCES, INC.,	§	CIVIL ACTION NOS.
Plaintiff,	§	2:12-cv-00548-MSD-TEM
v.	§	2:13-cv-00332-MSD-TEM
SAMSUNG ELECTRONICS CO., LTD, SAMSUNG ELECTRONICS AMERICA, INC., AND SAMSUNG TELECOMMUNICATIONS AMERICA, LLC,	§	
Defendants.	§	

STIPULATED FINAL JUDGMENT

In the Court's April 11, 2014 Opinion and Order (VIS II, ECF No. 250) on Defendants' Motion for Partial Summary Judgment (VIS II, ECF No. 85) and Order (VIS I, ECF No. 557) on Defendants' Motion in Limine No. 11 (VIS I, ECF No. 443 and VIS II, ECF No. 149), the Court made the following rulings:

- (a) "Under a literal infringement theory, the accused MHL-enabled products in VIS II do not directly infringe the asserted claims of the '268, '381, and '398 patents" because they do not include an HDMI output from the mobile terminal;
- (b) "a finding under the doctrine of equivalents that MHL is equivalent to HDMI would essentially render the HDMI limitation meaningless and would vitiate the limitation" in the asserted claims of the '268, '381, and '398 patents;

- (c) Plaintiff failed to timely present a theory of infringement under the doctrine of equivalents in VIS I under Fed. R. Civ. P. 26;
- (d) Plaintiff is precluded from arguing that the accused smartphones in VIS I infringe the asserted claims of '268 Patent, the '381 Patent, and the '398 Patent under the doctrine of equivalents;
- (e) "a reasonable fact finder could not find MHL to be an equivalent to HDMI in the output interface limitations" of those claims;
- (f) "any conversion to a display format, i.e. an uncompressed format, must occur prior to its transmission from the mobile terminal to the alternative display via an output interface. Thus, a format which requires not just decoding, but deconstruction and reassembly after it is received by the alternative display is not a 'display format'";
- (g) "when the MHL signal arrives at the alternative display, the previously interleaved segments of data must be deconstructed and reassembled into the original four channels of data, and the clock channel must be divided by a factor of three, before the data can be displayed"; and
- (h) "no reasonable jury could find that MHL constitutes a 'display format,' as HDMI does" (ECF No. 250).

On April 29, 2014, Plaintiff and Defendants made the following stipulations:

- (a) The Court's Summary Judgment Order found that the accused MHL-enabled products of VIS II do not directly infringe the asserted claims of the '268, '381, and '398 Patents, either literally or under the doctrine of equivalents;
- (b) Pursuant to the Court's determination that MHL is not an equivalent of HDMI, the MHL-enabled accused products in VIS II also cannot indirectly infringe the asserted claims of the

'268, '381 and '398 Patents when used in conjunction with an intermediate device because conversion to HDMI does not occur prior to transmission from the mobile terminal;

(c) The Court's Summary Judgment Order found that the accused MHL-enabled products of VIS II do not directly infringe the asserted claims of the '492, '711, and '268 Patents;

(d) Pursuant to the Court's determination that MHL is not a "display format," even drawing the inference in VIS's favor that HDMI is a display format, the MHL-enabled accused products cannot infringe the asserted claims of the '492, '711, and '268 Patents when used in conjunction with an intermediate device because conversion to a "display format" does not occur prior to transmission from the mobile terminal;

(e) Although the Court's Summary Judgment Opinion and Order (VIS II, ECF No. 250) addressed only accused products in VIS II, the accused products in VIS I cannot infringe the asserted claims for the same reasons;

(f) Plaintiff hereby dismisses without prejudice its claims against Samsung's Droid Charge as an accused product, and that product should be deleted from paragraph 37 of the Court's Amended Final Pretrial Order, which was entered on April 14, 2014. VIS I, ECF No. 560 at 4. As a result, all remaining accused products are either MHL-enabled, or are intermediate devices, and therefore governed by the Court's Summary Judgment Opinion and Order, and Plaintiff is precluded from offering evidence of infringement on any accused product remaining in either VIS I or VIS II;

(g) Defendants dismiss without prejudice their respective counterclaims for declaratory judgment of invalidity and unenforceability; and

(h) Defendants will not move for costs and attorneys' fees, if at all, until after resolution of the contemplated appeal, or within thirty (30) days following the deadline for filing a notice of appeal, whichever is later.

(VIS I, ECF No. 567; VIS II, ECF No. 267). These stipulations were to facilitate the immediate appeal of the Court's Final Judgment. Defendants contend that there are additional grounds for non-infringement and invalidity of all the asserted claims that are not addressed in the Court's summary judgment orders or as part of invalidity proceedings currently pending before the Patent & Trademark Office, and reserve their right to assert such additional grounds in the event that the appellate court remands the case to the District Court. Plaintiff agrees not to assert that the stipulations and corresponding appeal constitute grounds for challenging these defenses as waived in such a remand proceeding.

On April 15, 2014, the Parties indicated they were working to resolve the matter in a way that would not necessitate a trial, and the Court continued trial to May 27, 2014. (VIS I, ECF No. 566; VIS II, ECF No. 261.)

In accordance with the above, the Court hereby enters Final Judgment in this matter as follows:

1. **FINAL JUDGMENT** with respect to Plaintiff's claims of infringement of the '492 Patent against Defendants is entered against Plaintiff and in favor of Defendants, and Plaintiff shall take nothing of and from its claims of infringement of the '492 Patent against Defendants. All of Defendants counterclaims are **DISMISSED WITHOUT PREJUDICE**, without waiving Defendants' right to reassert any or all of these claims in this action or another, including but not limited to in the event that the appellate court remands the case to the District Court.

2. **FINAL JUDGMENT** with respect to Plaintiff's claims of infringement of the '711 Patent against Defendants is entered against Plaintiff and in favor of Defendants, and Plaintiff shall take nothing of and from its claims of infringement of the '711 Patent against Defendants. All of Defendants counterclaims are **DISMISSED WITHOUT PREJUDICE**, without waving Defendants' right to reassert any or all of these claims in this action or another, including but not limited to in the event that the appellate court remands the case to the District Court.
3. **FINAL JUDGMENT** with respect to Plaintiff's claims of infringement of the '268 Patent against Defendants is entered against Plaintiff and in favor of Defendants, and Plaintiff shall take nothing of and from its claims of infringement of the '268 Patent against Defendants. All of Defendants counterclaims are **DISMISSED WITHOUT PREJUDICE**, without waving Defendants' right to reassert any or all of these claims in this action or another, including but not limited to in the event that the appellate court remands the case to the District Court.
4. **FINAL JUDGMENT** with respect to Plaintiff's claims of infringement of the '381 Patent against Defendants is entered against Plaintiff and in favor of Defendants, and Plaintiff shall take nothing of and from its claims of infringement of the '381 Patent against Defendants. All of Defendants counterclaims are **DISMISSED WITHOUT PREJUDICE**, without waving Defendants' right to reassert any or all of these claims in this action or another, including but not limited to in the event that the appellate court remands the case to the District Court.
5. **FINAL JUDGMENT** with respect to Plaintiff's claims of infringement of the '398 Patent against Defendants is entered against Plaintiff and in favor of Defendants, and Plaintiff

shall take nothing of and from its claims of infringement of the '398 Patent against Defendants. All of Defendants' counterclaims are **DISMISSED WITHOUT PREJUDICE**, without waiving Defendants' right to reassert any or all of these claims in this action or another, including but not limited to in the event that the appellate court remands the case to the District Court.

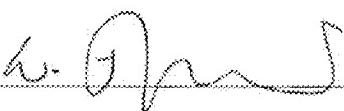
6. The deadline for the parties to seek recovery of costs (including filing a Notice of Application and proposed Bill of Costs) and/or attorney's fees is extended to thirty (30) days following issuance of a mandate in any appeal from this Final Judgment. To the extent no such appeal is filed, the deadline shall be thirty (30) days following the deadline for filing a notice of appeal.
7. Subject to paragraph 6, all claims between the parties have now been resolved. This is a **FINAL AND APPEALABLE JUDGMENT.**

IT IS SO ORDERED.

May 5, 2014
Norfolk, Virginia


Mark S. Davis
United States District Judge

Mark S. Davis
UNITED STATES DISTRICT JUDGE

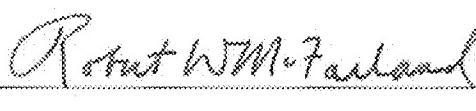
By: 

W. Ryan Snow, VSB No. 47423
David C. Hartnett, VSB No. 80452
CRENSHAW, WARE & MARTIN, P.L.C.
150 West Main Street, Suite 1500
Norfolk, Virginia 23510
Telephone: (757) 623-3000
Facsimile: (757) 623-5735
wrsnow@cwm-law.com
dhartnett@cwm-law.com

Edward E. Casto, Jr., Esq. (*pro hac vice*)
Edward R. Nelson, III, Esq. (*pro hac vice*)
Thomas C. Cecil, Esq. (*pro hac vice*)
Jonathan H. Rastegar, Esq. (*pro hac vice*)
Anthony Vecchione, Esq. (*pro hac vice*)
NELSON BUMGARDNER CASTO, P.C.
3131 West 7th Street, Suite 300
Fort Worth, Texas 76107
Telephone: (817) 377-9111
Facsimile: (817) 377-3485
enelson@nbclaw.net
ecasto@nbclaw.net
ccelil@nbclaw.net
jrastegar@nbclaw.net

Timothy E. Grochoinski, Esq. (*pro hac vice*)
INNOVALAW, P.C.
1900 Ravinia Place
Orland Park, Illinois 60462
Telephone: (708) 675-1975
teg@innovalaw.com

Counsel for Virginia Innovation Sciences, Inc.

By: 

Robert W. McFarland, VSB No. 24021
rmcfarland@mcguirewoods.com
Sarah K. McConaughy, VSB No. 80674
smeconauhy@mcguirewoods.com
MC GUIREWOODS LLP
World Trade Center
101 West Main Street, Suite 9000
Norfolk, Virginia 23510-1655
Telephone: (757) 640-3716
Facsimile: (757) 640-3966

Brett J. Williamson (*pro hac vice*)
bwilliamson@omm.com
O'MELVENY & MYERS LLP
610 Newport Center Drive, 17th Floor
Newport Beach, California 92660-6429
Telephone: (949) 760-9600
Facsimile: (949) 823-6994

Counsel for Defendants Samsung Electronics Co., Ltd., Samsung Electronics America, Inc., and Samsung Telecommunications America, LLC

EXHIBIT 1

(12) United States Patent
Wang et al.(10) Patent No.: US 7,899,492 B2
(45) Date of Patent: Mar. 1, 2011(54) METHODS, SYSTEMS AND APPARATUS FOR
DISPLAYING THE MULTIMEDIA
INFORMATION FROM WIRELESS
COMMUNICATION NETWORKS(75) Inventors: **Tiejun (Ronald) Wang**, La Jolla, CA
(US); **William E. Halal**, Washington,
DC (US); **Tiehong (Ann) Wang**,
Arlington, VA (US); **Ximing Wang**,
Beijing (CN)(73) Assignee: **SellerBid, Inc.**, Arlington, VA (US)(*) Notice: Subject to any disclaimer, the term of this
patent is extended or adjusted under 35
U.S.C. 154(b) by 213 days.(21) Appl. No.: **11/165,341**(22) Filed: **Jun. 24, 2005**

(65) Prior Publication Data

US 2006/0077310 A1 Apr. 13, 2006

Related U.S. Application Data

(60) Provisional application No. 60/588,358, filed on Jul.
16, 2004.

(51) Int. Cl.

H04M 1/00 (2006.01)
H04B 1/38 (2006.01)(52) U.S. Cl. **455/556.1; 455/566**(58) Field of Classification Search **455/556.1-2;**
455/414.1-4, 466, 66.1, 550.1, 553.1, 557,
455/90.3, 566, 559, 3.01, 3.06, 3.04, 414.4;
348/14.08, 14.04, 838, 554, 14.02, 14.07,
348/575, 14.13, 14.12, 384.1, 441; 375/240.1,
375/240.02, 240.18

See application file for complete search history.

(56) References Cited

U.S. PATENT DOCUMENTS

4,740,963 A 4/1988 Eckley

5,610,971 A	3/1997	Vandivier
5,880,732 A *	3/1999	Tryding
6,128,509 A *	10/2000	Veijola et al. 455/556.1
6,181,954 B1	1/2001	Monroe et al.
6,275,333 B1	8/2001	Shaffer
6,404,763 B1	6/2002	Renucci et al.
6,546,263 B1	4/2003	Petty et al.
6,690,417 B1	2/2004	Yoshida et al.
6,718,182 B1	4/2004	Kung
6,781,635 B1 *	8/2004	Takeda
6,859,358 B2	2/2005	Baldwin et al.

(Continued)

FOREIGN PATENT DOCUMENTS

EP 1429511 A1 * 6/2004

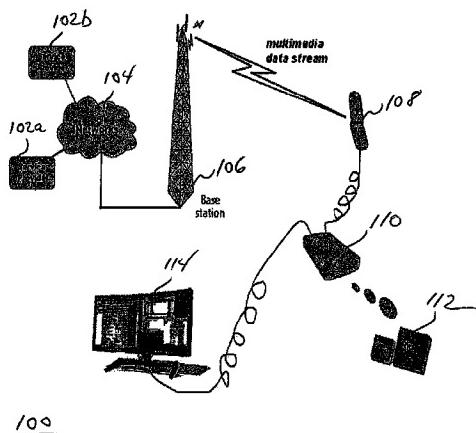
OTHER PUBLICATIONS

Notification of Transmittal of the International Search Report and the
Written Opinion of the International Searching Authority, or the
Declaration; International Application No. PCT/US05/25284; Filing
Date: Jul. 15, 2005.Primary Examiner—George Eng
Assistant Examiner—Brandon J Miller(74) Attorney, Agent, or Firm—Rader Fishman & Grauer
PLLC

(57) ABSTRACT

Video signals for a mobile terminal are converted to accommodate reproduction by an alternative display terminal. The video signal from a wireless communication network is processed to provide a converted video signal appropriate for an alternative display terminal. This converted video signal is then provided to accommodate the corresponding video display on a screen provided by the alternative (e.g., external) display terminal.

33 Claims, 7 Drawing Sheets



US 7,899,492 B2

Page 2

U.S. PATENT DOCUMENTS

6,873,853	B2 *	3/2005	Kim	455/466	2003/0104806	A1 *	6/2003	Ruef et al.	455/422
6,907,276	B2	6/2005	Toba		2003/0130009	A1 *	7/2003	Kung	455/557
6,970,127	B2 *	11/2005	Rakib	341/173	2004/0046783	A1	3/2004	Montebovi	
7,248,888	B2 *	7/2007	Inselberg	455/517	2004/0056985	A1	3/2004	Seong	
7,257,202	B2 *	8/2007	Umemura et al.	379/88.14	2004/0125136	A1	7/2004	Wallenius	
7,312,813	B1 *	12/2007	Heinonen	348/158	2004/0157642	A1	8/2004	Lee et al.	
7,360,085	B2 *	4/2008	Loveria, III	713/165	2004/0177376	A1 *	9/2004	Caspi et al.	725/81
2002/0090980	A1 *	7/2002	Wilcox et al.	455/566	2004/0212731	A1 *	10/2004	Sie et al.	348/445
2002/0094826	A1	7/2002	Lee		2005/0036509	A1 *	2/2005	Acharya et al.	370/466
2002/0102998	A1 *	8/2002	Lin	455/466	2005/0085183	A1 *	4/2005	Lee	455/3.01
2002/0137505	A1	9/2002	Eiche et al.		2005/0088463	A1	4/2005	Schilling	
2002/0137551	A1	9/2002	Toba		2005/0144641	A1 *	6/2005	Lewis	725/60
2003/0054794	A1	3/2003	Zhang		2006/0001737	A1 *	1/2006	Dawson et al.	348/14.08
					2007/0287498	A1 *	12/2007	Wang et al.	455/556.1

* cited by examiner

U.S. Patent

Mar. 1, 2011

Sheet 1 of 7

US 7,899,492 B2

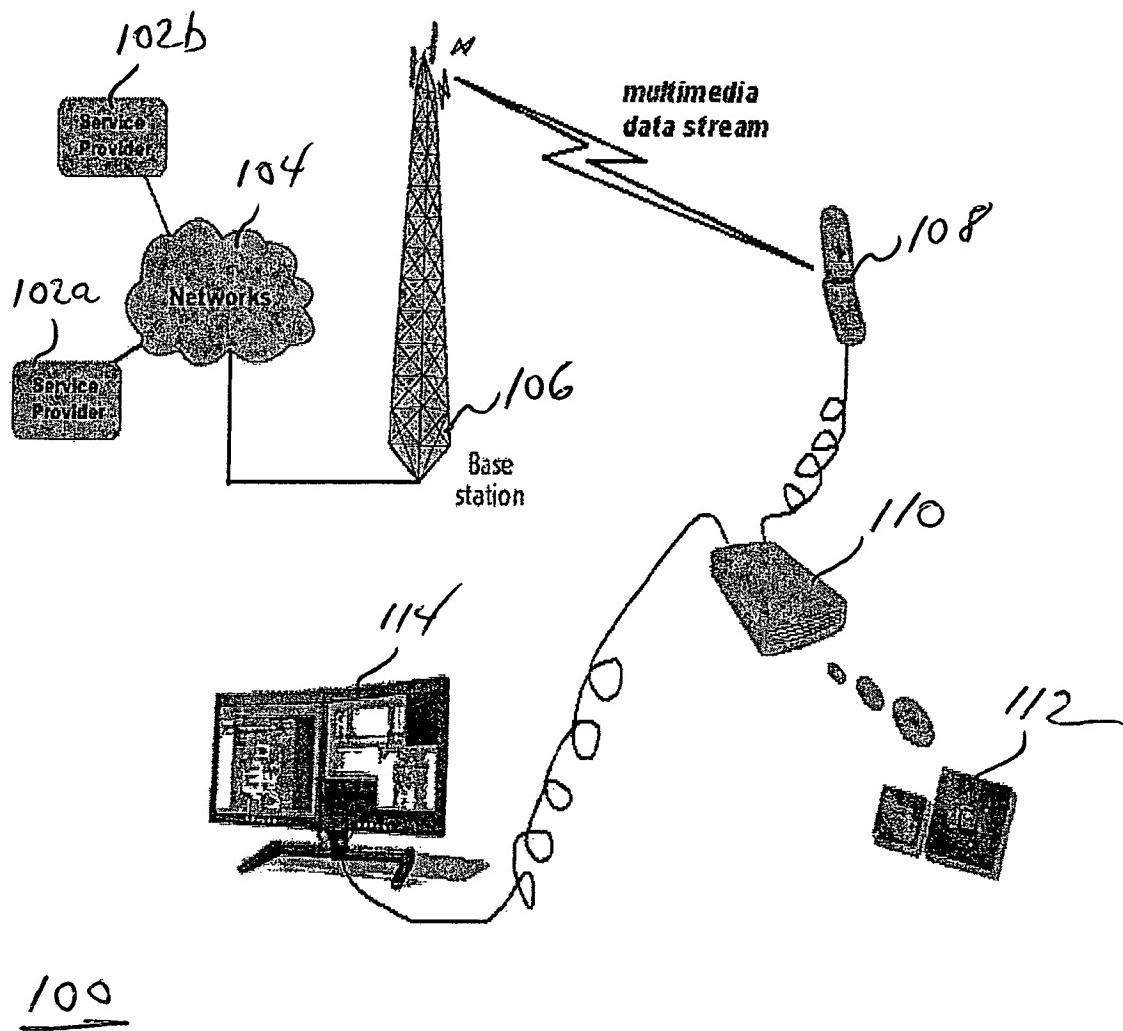


FIG. 1

U.S. Patent

Mar. 1, 2011

Sheet 2 of 7

US 7,899,492 B2

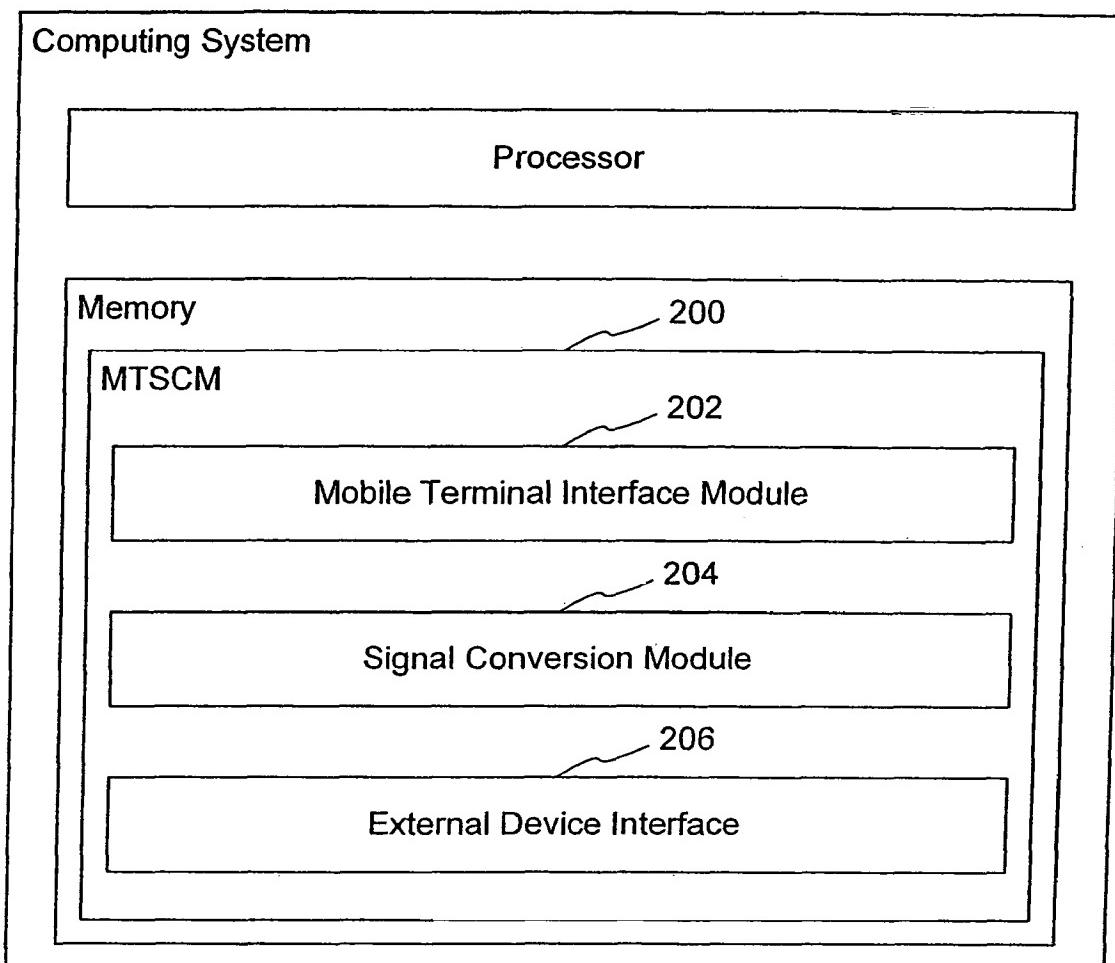


FIG. 2

U.S. Patent

Mar. 1, 2011

Sheet 3 of 7

US 7,899,492 B2

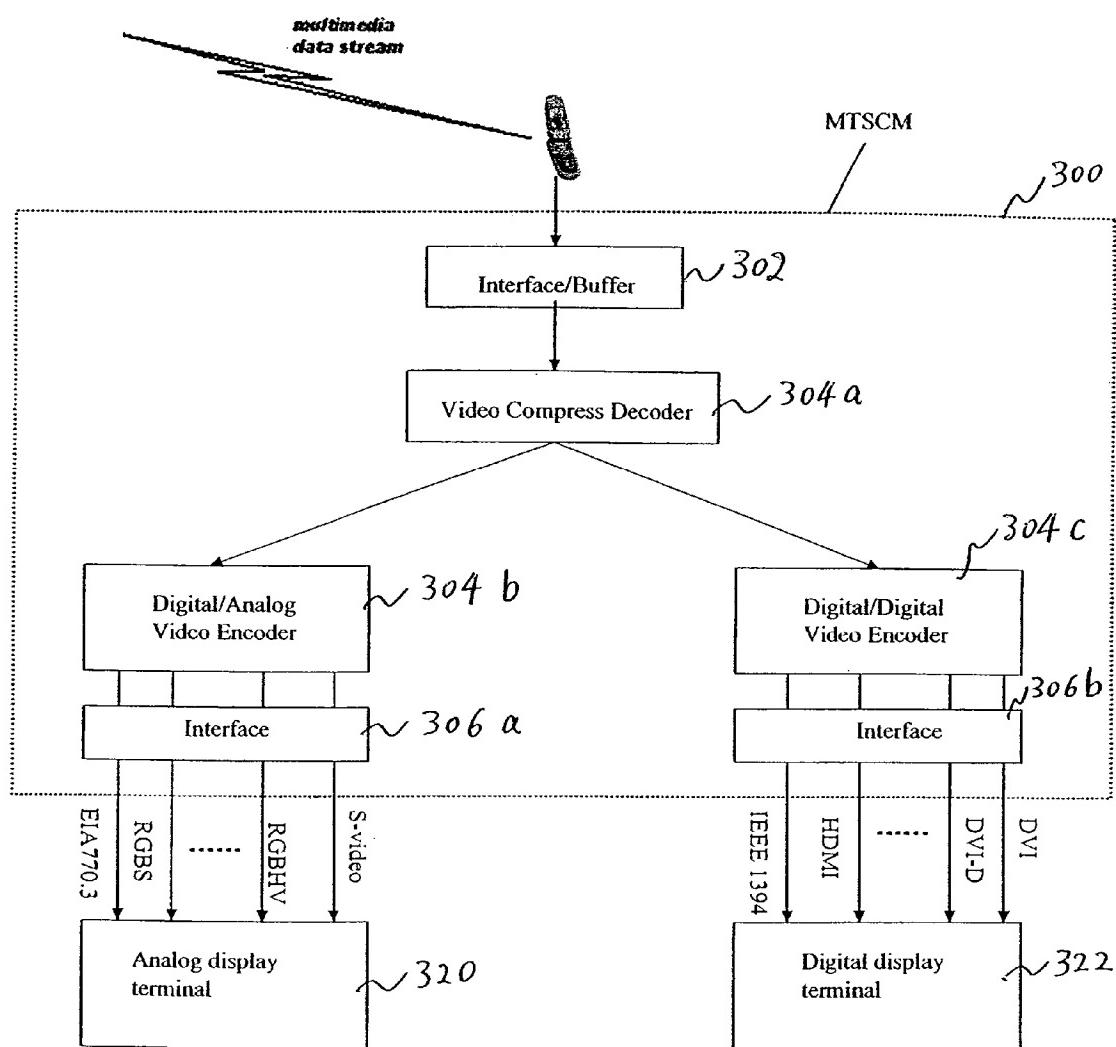


FIG. 3

U.S. Patent

Mar. 1, 2011

Sheet 4 of 7

US 7,899,492 B2

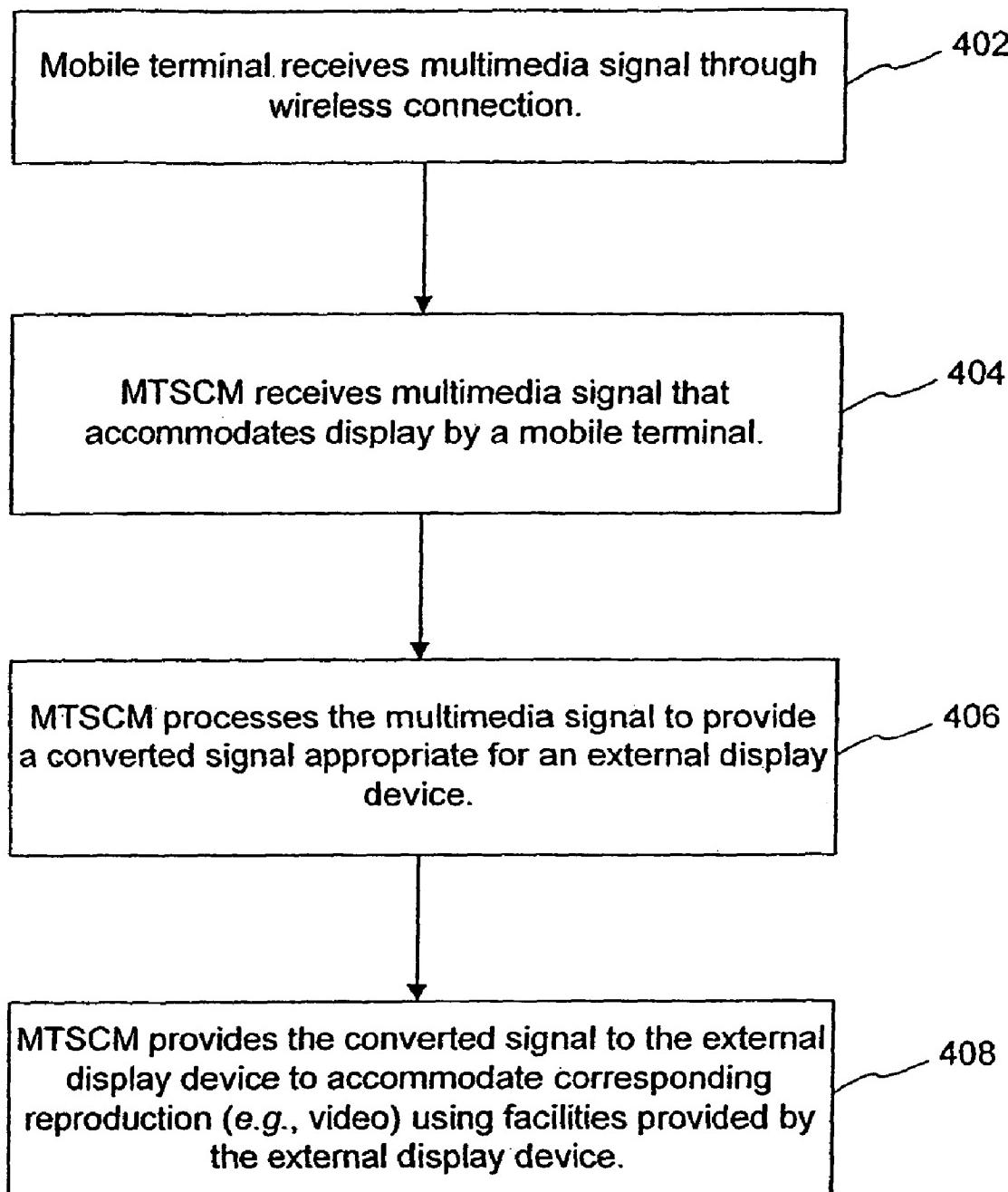


FIG. 4

U.S. Patent

Mar. 1, 2011

Sheet 5 of 7

US 7,899,492 B2

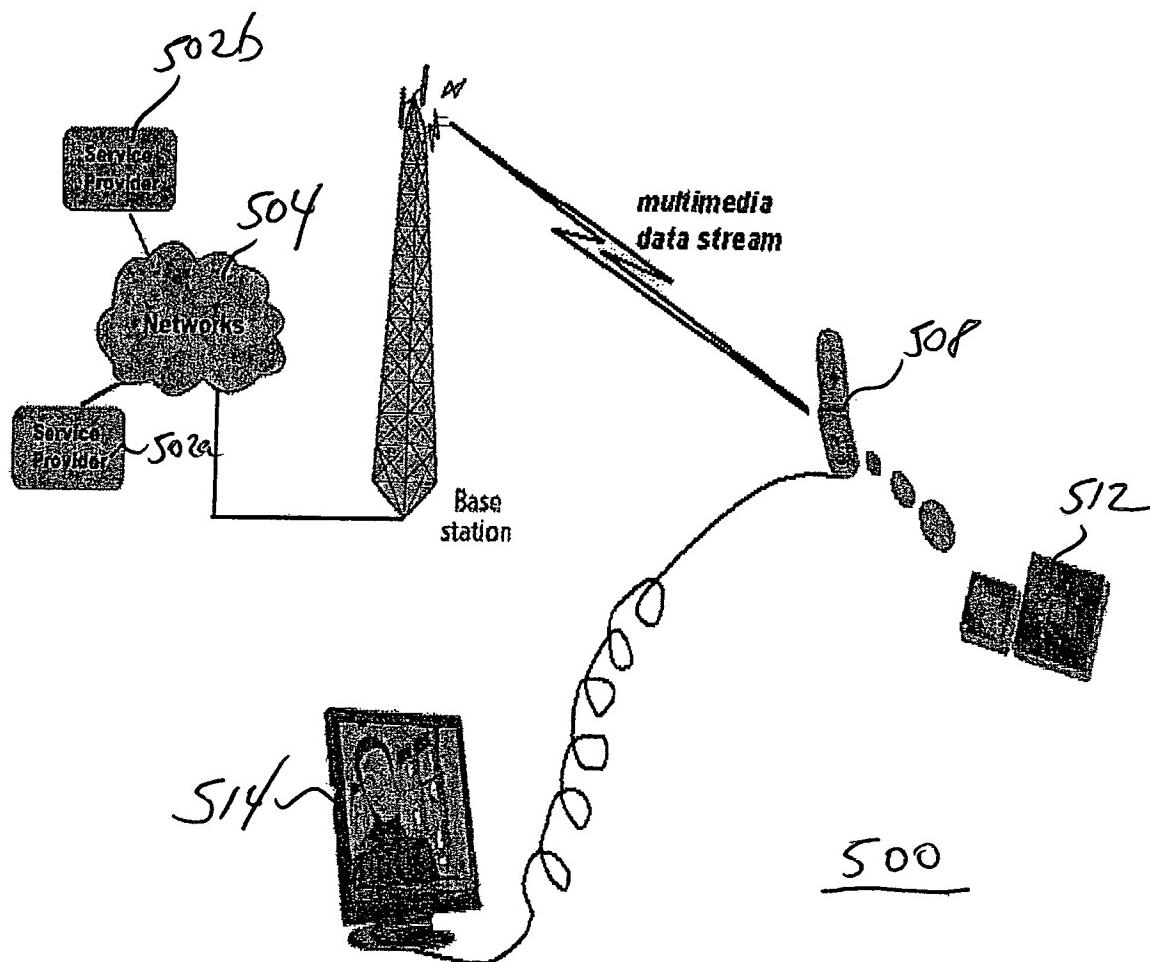


FIG. 5

U.S. Patent

Mar. 1, 2011

Sheet 6 of 7

US 7,899,492 B2

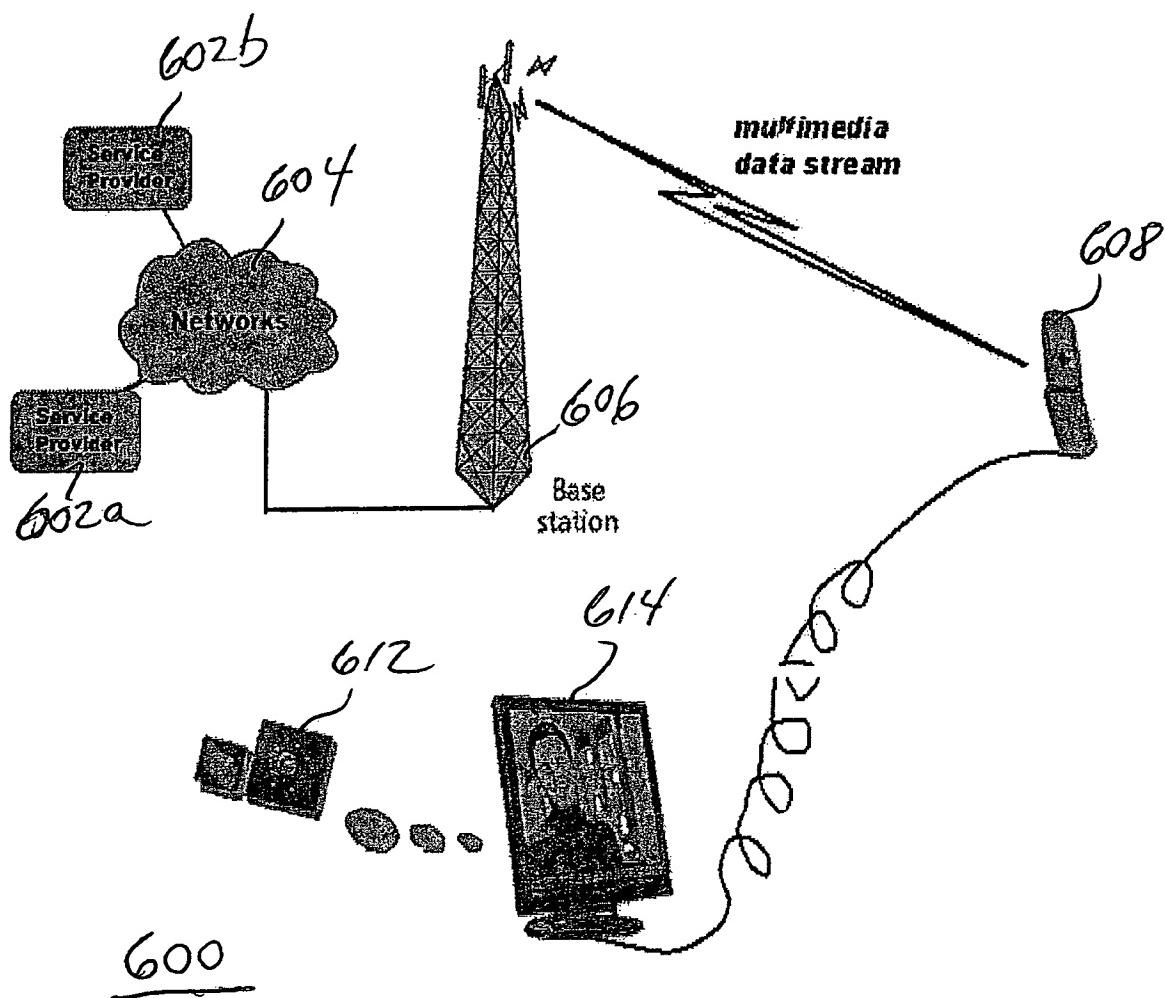


FIG. 6

U.S. Patent

Mar. 1, 2011

Sheet 7 of 7

US 7,899,492 B2

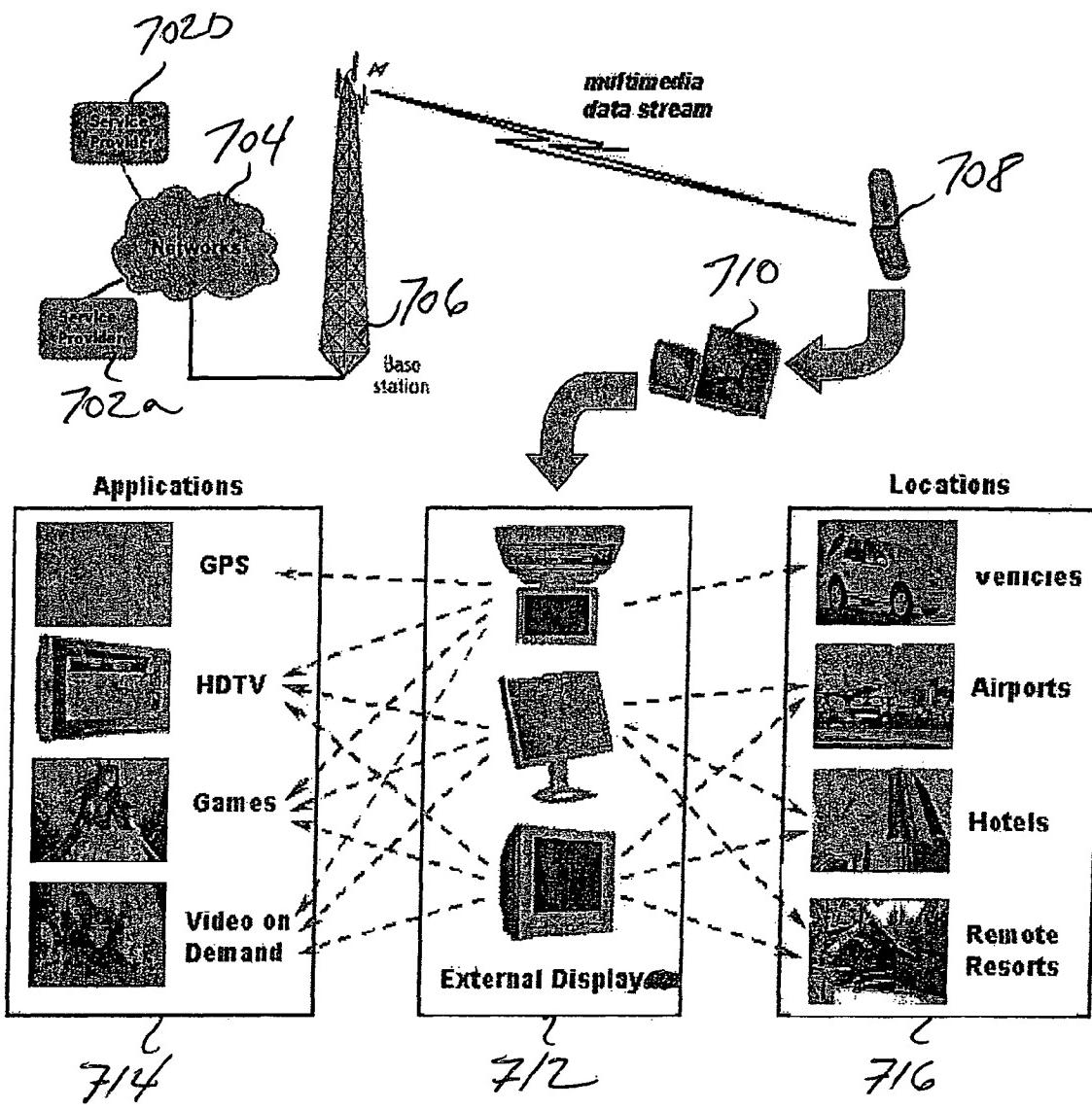


FIG. 7

US 7,899,492 B2

1

METHODS, SYSTEMS AND APPARATUS FOR DISPLAYING THE MULTIMEDIA INFORMATION FROM WIRELESS COMMUNICATION NETWORKS

CROSS REFERENCE TO RELATED APPLICATIONS

This application claims the benefit of provisional application Ser. No. 60/588,358 filed on Jul. 16, 2004 and entitled "A Method and System for Displaying the Multimedia Information from Wireless Communications or Portable IT Devices," the entire contents of which are hereby incorporated by reference.

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates generally to mobile terminals and related technology and more particularly to mobile terminal signal conversion for external display.

2. Description of the Related Art

Handheld mobile terminals (e.g., cellular phones, personal digital assistants (PDA)) continue to evolve both in terms of execution platform and functionality. It is believed that the much of the functionality provided by a personal computer (e.g., desktop or laptop) will ultimately become virtually available in handheld mobile terminals, which will allow users to work with and access multimedia information any time and anywhere.

For example, one particularly appealing advantage of the next generation wireless communication system and beyond (i.e., 3G, 4G, etc.) is the capacity to support high rate multi-media data services as well as conventional voice services. In a conventional cellular system a mobile terminal communicates with a base station wirelessly. Multimedia information including but not limited to television, 3D images, network games, and video phone calls is transmitted from various service providers and received for display on the screen of a mobile terminal. The net result of such a system is rich multimedia information being destined for display on the small screens typical of cellular phones (or the like).

In these and similar systems, the mobile terminal functions as a multimedia terminal to display multimedia information (including high-resolution graphics and high-quality real-time audio/video) sent from high data rate wireless communications network. The limited size (e.g., 2x3") and capability of the mobile terminal screen may render enjoyment of the high rate data flow applications inconvenient, and in some instances useless. One consequence of this inadequacy is likely shrinkage of the potential market size for handheld mobile terminals. Indeed, some have suggested that development of high data rate systems such as 3G systems may be pointless given the limitations imposed by the small screen.

Some mobile units appear to provide a remote control function to an external display system. However, these do not appear to solve the small screen problem outlined above. That is, they do not accommodate display on a larger, external display of video and other multimedia information originally destined for the mobile terminal display screen.

For example, one such interface accommodates usage of the mobile terminal as a remote control for a television, by feeding programming guide information to the mobile terminal. This is useful for allowing the programming guide to be viewed locally while the larger screen displays a current program, but does not address to the above-described small screen problem.

2

Although mobile terminals have been developed to include enhanced signal processing and related capabilities, user enjoyment is diminished by the limitations of the display provided with such mobile terminals. What is needed is a solution to the problem of diminished user enjoyment of mobile terminals because of display limitations.

SUMMARY OF THE INVENTION

10 In accordance with the present invention, the multimedia signal destined for the mobile terminal is converted and provided to an alternative (e.g., external) display system, so that the corresponding video and/or audio signals from wireless communication networks may be received and reproduced using the alternative system.

15 It is believed that this feature will be useful in various environments, including but not limited to transportation environments such as planes, trains and automobiles; hotels; waiting areas; and any location where high data rate services can be more fully supported by external display terminals.

According to one aspect, processing signals for reproduction by an external display terminal includes receiving a video signal that accommodates a video display on a first screen provided by the mobile terminal. The video signal is then processed to provide a converted video signal appropriate for an external display terminal that is separate from the mobile terminal. This converted video signal is then provided for the external display terminal to accommodate the corresponding video display on a screen provided by the external display terminal.

The present invention can be embodied in various forms, including business processes, computer implemented methods, computer program products, computer systems and networks, user interfaces, application programming interfaces, and the like.

BRIEF DESCRIPTION OF THE DRAWINGS

These and other more detailed and specific features of the present invention are more fully disclosed in the following specification, reference being had to the accompanying drawings, in which:

FIG. 1 is a schematic diagram illustrating an example of a system in which mobile terminal signal conversion may reside in accordance with the present invention.

45 FIG. 2 is a block diagram illustrating an example of a mobile terminal signal conversion module in accordance with the present invention.

FIG. 3 is a block diagram illustrating another example of a mobile terminal signal conversion module in accordance with the present invention.

FIG. 4 is a flow diagram illustrating an embodiment of a process including mobile terminal signal conversion in accordance with the present invention.

55 FIG. 5 is a schematic diagram illustrating another example
of a system in which mobile terminal signal conversion may
reside in accordance with the present invention.

FIG. 6 is a schematic diagram illustrating still another example of a system in which mobile terminal signal conversion may reside in accordance with the present invention.

DETAILED DESCRIPTION OF THE INVENTION

In the following description, for purposes of explanation, numerous details are set forth, such as flowcharts and system

US 7,899,492 B2

3

configurations, in order to provide an understanding of one or more embodiments of the present invention. However, it is and will be apparent to one skilled in the art that these specific details are not required in order to practice the present invention.

FIG. 1 is a schematic diagram illustrating an example of a system 100 in which mobile terminal signal conversion may reside in accordance with the present invention.

Mobile terminal signal conversion accommodates displaying the high rate data flow multimedia information available in a wireless communication environment in an external device. This accommodates true realization and enjoyment of the benefits of the multimedia content.

In one example, the multimedia information is provided to a wireless mobile terminal using so-called next generation cellular technology (i.e., 3G and 4G), which can be employed in transmitting multimedia information (e.g., rich graphics, real-time audio/video). Because of the relatively small screen size and low quality ear phones, for many applications the mobile terminal cannot adequately reproduce the high quality multimedia information that can be communicated using next generation technology with adequate clarity and satisfaction. Mobile terminal signal conversion in accordance with this embodiment of the present invention makes usage of a separate multimedia display terminal including but not limited to a monitor, television set, projector, or LCD display. These displays typically have video and audio reproduction capabilities that are superior to those found on mobile terminals. They also use a power supply that is separate from the mobile terminal.

Still referring to the system **100** illustrated in FIG. 1, multimedia information may be provided by any number of service providers **102a-b** and delivered through a network **104** to a base station **106** to ultimately accommodate transmission of the multimedia information, among other things, to a cellular phone **108**. This system **100** is provided by way of example, and it should be understood that any conventional or to-be-developed technology for delivering voice and/or data to mobile terminals may be provided. These wireless communication networks include but are not limited to a cellular communications network or a wireless local area network.

Also illustrated is a typical external display system 114. This may also be variously provided and may be digital or analog. Examples of digital systems include HDTV, LCD and plasma. Examples of analog systems include television sets that implement standards such as NTSC, PAL, SECAM, and analog computer monitors (SVGA, VGA). The external display system 114 does not have the size constraints of the display screen on the cellular phone 108 and is preferably powered independently.

In the illustrated embodiment, a mobile terminal signal conversion module (MTSCM) 112 resides within a separate housing 110, outside the cellular phone 108.

The functionality of the MTSCM 112 is now further described with concurrent reference to FIG. 1 and the flow diagram of FIG. 4.

The MTSCM 112 processes signals to accommodate reproduction by an external device. Specifically, a multimedia signal is transmitted to the cellular phone 108 through the wireless communications network as previously described (step 402). The multimedia signal may include a video signal intended for reproduction by the cellular phone 108, using the cellular phone display screen. For ease of description, processing of a video signal is described, although it should be understood that any multimedia signal or component thereof may be converted in accordance with the present invention.

4

The cellular phone **108** is connected to the MTSCM **110**. This may be accommodated by a cable connection that interfaces the cellular phone **108** to the MTSCM **112** housing **110**. Through this connection, the MTSCM **112** receives the video signal from the cellular phone **108** (step **404**). The video signal as received may be configured to accommodate a video display on the screen provided by the cellular phone **108**. The cable connection is an example of a wired connection interfacing the cellular phone **108** to the MTSCM **112**. An alternative wired connection is a seat that directly interfaces the two without a cable. A wireless connection may also be provided, although it may currently be less practical to provide than the wired connection because of the potential for high throughput rate requirements. The wireless connection may also implement any conventional known technology including but not limited to a Bluetooth connection.

including but not limited to a Bluetooth connection.

The MTSCM 112 processes the video signal to provide a converted video signal that has a display format and/or signal power level appropriate for an external display terminal 114.

20 that is separate from the cellular phone 108 (step 406). The display format and/or signal power level of the external display terminal 114 may be different from that of the cellular phone 108 but there may also be embodiments where the format is the same. Even if the formats are the same, conversion of the signals to accommodate display on the external display terminal 114 would still be implemented to adjust the power level for driving the external display, and possibly to minimize throughput requirements. This signal conversion is described further with reference to FIGS. 2 and 3, below.

30 Still referring to FIGS. 1 and 4, following signal conversion, the MTSCM 112 provides the converted video signal to the external display terminal 114 to accommodate the corresponding video display on a screen provided by the external display terminal 114 (step 408). This may be accommodated
35 through a connection between the MTSCM 112 housing 110 and the external display terminal 114 as shown.

and the external display terminal, 111 as shown.

As used herein, mobile terminal refers to typically handheld mobile devices such as cellular phones and personal digital assistants. Although these devices include an execution platform as well as input and display capabilities, such devices are distinguished from personal computers, such as desktop or laptop computers, which are not designed for convenient handheld usage.

FIG. 2 is a block diagram illustrating an example of an MTSCM 200 in accordance with the present invention. The MTSCM 200 may be provided as software, firmware, hardware, or any combination thereof.

Where the MTSCM **200** is provided as software, it operates in the context of an execution platform. That is, the MTSCM **200** includes instructions that are stored in memory for execution by a processor. Any conventional or to-be-developed execution platform may be used. The processor, memory, and related elements such as a power supply are well known and need not be described herein to convey an understanding of the invention. Additionally, FIG. 2 illustrates one modular breakdown for the components of the MTSCM **200**. It should be understood that the described functionality may alternatively be provided by an MTSCM having fewer, greater, or differently named modules from those illustrated in the fig-

Additionally, although modules as shown to reside in a common location, it is noted that the functionality may reside in separate components of a system that includes a mobile terminal, an external monitor, and (optionally) an intermediate device housing the MTSCM and interfacing the mobile terminal and external monitor. In other words, the overall functionality of the MTSCM may be separated such that

US 7,899,492 B2

5

portions of the overall functionality are respectively provided by the mobile terminal, separate intermediate housing, and/or the external display device.

The MTSCM 200 may also be provided in the form of a chipset, configured for inclusion in a mobile terminal, dedicated separate signal conversion device, or external display terminal, and to provide the described mobile terminal signal conversion functionality.

The MTSCM 200 includes a mobile terminal interface module 202, a signal conversion module 204, and an external device interface module 206.

The mobile terminal interface module **202** accommodates receiving the multimedia signal from the mobile terminal. A conventional physical interface provides a connection between the MTSCM **200** and the mobile terminal through which the signals flow to the MTSCM **200**. The mobile terminal interface module **202** recognizes the multimedia signal and stores the signal for processing by the remaining modules. Buffering and the like may be implemented to accommodate storage and signal processing, as described further below.

The signal conversion module **204** is in communication with the mobile terminal interface module **202** and thus accesses the received multimedia signal. The signal conversion module **204** recognizes the multimedia signal format, and processes the multimedia signal to provide a converted signal. The converted signal may have a format and a signal power level that differs from the one used by the mobile terminal, as appropriate for one or more types of external devices to which the MTSCM **200** is connected. Various examples of the type of devices to which the MTSCM **200** may be connected are illustrated and described in connection with FIG. 3, below.

The external device interface **206** is in communication with the signal conversion module **204** and thus accesses the converted signal. The external device interface **206** also allows connection to the external (e.g., display) device. The external device interface **206** may provide both the feeding of the converted signal to the external device, and driving the external device. Alternatively, the external device interface **206** may merely feed the converted signal to the external device, with the external device including internal elements for driving its signal reproduction (e.g., display) facilities.

FIG. 3 is a block diagram illustrating another example of the MTSCM 300. The MTSCM 300 includes additional detail regarding the signal conversion aspect, and illustrates examples of differing types of external devices to which the MTSCM 300 may provide converted signals. The illustration and corresponding description are provided by way of example. Although numerous connections are illustrated, it should be understood that the present invention may be practiced in the context of providing as few as one, and as many as all of the listed connections. It should also be understood that there may be additional examples that are not listed herein, but which are encompassed by the teachings described herein.

The MTSCM 300 includes an interface/buffer module 302 that is analogous to the previously described mobile terminal interface module. The buffer and interfacing are configured to accommodate signal processing by the remaining elements in support of the requirements and expectations of users of the multimedia signal output (e.g., adequate buffering and processing rate to provide real time audio/video). The mobile terminal video compression format may of course vary, but currently the most likely format is MPEG-1 or MPEG-2. Buffering and throughput rate may also be provided as desired by the designer. Currently, it is believed that 200 Mb

6

is an adequate buffer size, although buffers of 500 Mb or more may of course be provided. Additionally, a throughput rate of approximately 10 Gb/s will be adequate for many current systems, but may be increased as demands and technology evolve.

The Video Compress Decoder 304a receives the multimedia signal. The multimedia signal is typically provided in a compressed format to accommodate increased signal transfer rates. An example of a compression scheme is that provided by one of the MPEG standards (e.g., MPEG-1, MPEG-2, MPEG-4). The Video Compress Decoder 304a is configured to include the appropriate compression/decompression (CODEC) module to accommodate decompression of the received multimedia signal. For example, where the compression scheme is MPEG, the Video Compress Decoder 304a includes an MPEG CODEC to accommodate processing of such multimedia signals.

As an alternative to provision of the Video Compress Decoder 304a in the MTSCM 300, the functionality may be provided within the cellular phone or other mobile terminal. However, this may be less practical because of the high bandwidth that would be required between the cellular phone and the MTSCM 300 to deliver the decompressed signal, and the corresponding likelihood of a larger buffer requirement for the MTSCM 300.

The Video Compress Decoder 304a outputs a decompressed digital multimedia signal that is passed to the Digital/Analog Video Encoder (DAVE) 304b and/or the Digital/Digital Video Encoder (DDVE) 304c. The DAVE 304b is configured to prepare signals for analog external display terminals 320, and the DDVE 304c is configured to prepare signals for digital external display terminals 322. The DAVE 304b and DDVE 304c respectively receive the decompressed multimedia signal and convert the signals to the format(s) and signal power level(s) required for the terminals to which they interface.

Examples of formats used by analog display terminals **320** include S-video, RGBHV, RGBS, and EIA770.3 as illustrated. Similarly, the DDVE **304c** provides output using standards such as DVI, DVI-D, HDMI, and IEEE1394. The signals respectively provided by the DAVE **304b** and DDVE **304c** are provided to the terminals through conventional interfaces **306a-b**. The DAVE **304b** functionality may be embodied as a video card that is configured accordingly. Examples of video cards that may be configured to provide the described functionality include but are not limited to the Diamond Stealth S60, ASUS V9400-X, or RADEON 7000.

Ultimately, the signals are used to provide a display on the external display, as required according to the particular type of display. For example, the video data stream may be a digital RGB signal which represents the intensity of the red, green and blue light respectively at different position. This signal is converted to analog by a D/A converter. This converted analog signal is quantified to the voltage and format required by the standard, such as the input of cathode-ray-tube (CRT) monitor. This standard video signal will drive a set of electron guns, which produce a controlled stream of electrons to display of red, green and blue light respectively on a CRT screen. This is but one example and the present invention is not limited to a particular technology (e.g., CRT) for the external display.

As described, in one embodiment the MTSCM may be independently housed separately from both the mobile terminal and external display terminal, with respective connections to the other devices to provide a system configuration that includes the three pieces of hardware (mobile terminal, conversion box, external display terminal). This configuration

US 7,899,492 B2

۷

provides the flexibility of allowing any standard mobile terminal and/or display to be potentially interface with the MTSCM without imposing constraints on the mobile terminal or external display terminal manufacturers. A possible drawback to this configuration is that additional hardware is introduced into the system.

In lieu of the three component system, the MTSCM may be located in either the mobile terminal or the external display. FIG. 5 is a schematic diagram illustrates an example of a system 500 in which the MTSCM mobile terminal signal conversion may reside within the mobile terminal 508. The components and functionality of the service providers 502a,b network 504 and base station 506 for delivering multimedia signals to the mobile terminal 508 is the same as for the analogous elements of FIG. 1 and need not be re-described. Similarly, the external display terminal 514 may be any of the various types named above.

The MTSCM 512 provides the same functionality described above. However, in contrast to residence in a separate housing, the MTSCM 512 is a component of the mobile terminal 508. A potential advantage of this system 500 is that, again, any standard equipment can serve as an external display terminal 514, without a constraint on the display manufacturer. Additionally, only a simple wired or wireless interface is required to connect the external display with the mobile terminal 508. This means, for example, that the user will not be required to carry a bulky conversion module in addition to their cellular phone.

A potential drawback to this system **500** is that the execution platform of the mobile terminal **508** may be designed to accommodate only traditional functionality, so for some systems it may be challenging to add the MTSCM functionality to the existing platform. Additionally, the MTSCM will consume power that may unduly exhaust the limited power supply offered by the mobile terminal **508** battery. It is useful for this embodiment to provide power to the mobile terminal **508** through the cable connection to the external display terminal **514**, but again this may require modification to the mobile terminal **508** as the existing charger interface may be insufficient.

FIG. 6 is a schematic diagram illustrating another example of a system 600, in which the MTSCM 612 resides within the external display terminal 614. As with FIG. 5, the components and functionality of the service providers 602*a,b* network 604 and base station 606 for delivering multimedia signals to the mobile terminal 608 is the same as for the analogous elements of FIG. 1 and need not be re-described.

Here, the mobile terminal **608** need only be connected directly to the external display terminal **614**. However, in lieu of having the MTSCM **612** functionality reside within the mobile terminal **608**, it is part of the external display terminal **614**. The power supply and execution platform issues associated with placing the MTSCM **614** in the mobile terminal are resolved with this system **600**, and any mobile terminal **608** can potentially be connected to any MTSCM-ready external display without requiring modification, other than provision of an output interface. A potential drawback of this configuration is that it adds a component to the standard external display terminal, and corresponding costs.

FIG. 7 is a schematic diagram illustrating examples of mobile terminal signal conversion applications 700 in accordance with the present invention. These applications 700 are provided by way of example, to give the reader an understanding of the potential contexts in which embodiments of the present invention may operate. The present invention is not limited to the disclosed applications, nor are all potential applications required for any given embodiment.

8

The basic architecture for provision of the wireless communications signal and corresponding multimedia signal is as described above for the service providers 702a-b, network 704, base station 706 and mobile terminal 708. The MTSCM 710 may be separate or reside in the mobile terminal 708 or display terminal 712. Examples of applications 714 where a larger screen and potentially superior audio may be enjoyed include video conference, HDTV, games, GPS, and video on demand. Additionally, embodiments of the present invention will accommodate enjoyment of full multimedia capability in locations 716 including vehicles, airports, hotels and remote resorts. Thus, for example, the present invention accommodates usage inside a vehicle, a plane or any type of transportation, enabling the passenger to browse the Internet, watch TV, play games, participate in a video conference or call, and work on all sorts of software with full functionality.

work on all sorts of software with full functionality.

Thus embodiments of the present invention produce and provide mobile terminal signal conversion. Although the present invention has been described in considerable detail with reference to certain embodiments thereof, the invention may be variously embodied without departing from the spirit or scope of the invention. Therefore, the following claims should not be limited to the description of the embodiments contained herein in any way.

The invention claimed is:

1. A method for processing signals to accommodate reproduction by an alternative display terminal, the method comprising:
30 receiving by a conversion module a video signal appropriate for displaying a video content on a mobile terminal, the video signal being received by the conversion module from a cellular network communication that is sent to the mobile terminal and then received by the conversion module;
35 processing by the conversion module the video signal to produce a converted video signal for use by the alternative display terminal, wherein processing by the conversion module includes converting the video signal from a compression format appropriate for the mobile terminal to a display format for the alternative display terminal that is different from the compression format, such that the converted video signal produced by the conversion module comprises a display format and a power level appropriate for driving the alternative display terminal; and
40 providing the converted video signal from the conversion module to the alternative display terminal to accommodate displaying the video content by the alternative display terminal.
45

2. The method of claim 1, wherein the mobile terminal is a cellular phone.

3. The method of claim 1, wherein the mobile terminal is a personal digital assistant.

50 4. The method of claim 1, wherein receiving the video signal, processing the video to produce the converted video signal, and providing the converted video signal to the alternative display terminal is performed using power from a source that differs from the internal power supply of the mobile terminal.

55 5. The method of claim 1, wherein the conversion module resides in the alternative display terminal.

6. The method of claim 1, wherein the video signal received is part of a multimedia signal that is received in the cellular network communication.

55 7. The method of claim 1, wherein the alternative display terminal is an external display terminal.

US 7,899,492 B2

9

8. The method of claim 1, wherein the alternative display terminal is an analog display device.

9. The method of claim 8, wherein the analog display device is a television set.

10. The method of claim 9, wherein the television set implements one or more of the following standards: NTSC, PAL or SECAM.

11. The method of claim 1, wherein the alternative display terminal is a digital display device.

12. A system for processing signals to accommodate reproduction by an alternative display terminal, the system comprising:

means for receiving a video signal appropriate for displaying a video content on a mobile terminal, the video signal being received from a cellular network communication that is sent to the mobile terminal and then received by the means for receiving the video signal;

means for processing the video signal to produce a converted video signal for use by the alternative display terminal, wherein processing by the means for processing the video signal includes converting the video signal from a compression format appropriate for the mobile terminal to a display format for the alternative display terminal that is different from the compression format, such that the converted video signal produced by the means for processing the video signal comprises a display format and a power level appropriate for driving the alternative display terminal; and

means for providing the converted video signal to the alternative display terminal to accommodate displaying the video content by the alternative display terminal.

13. The system of claim 12, wherein the mobile terminal is a cellular phone.

14. The system of claim 12, wherein the mobile terminal is a personal digital assistant.

15. The system of claim 12, wherein receiving the video signal, processing the video to produce the converted video signal, and providing the converted video signal to the alternative display terminal is performed using power from a source that differs from the internal power supply of the mobile terminal.

16. The system of claim 12, wherein the means for receiving the video signal, means for processing the video signal to produce the converted video signal, and means for providing the converted video signal to the display terminal reside in a conversion module within the alternative display terminal.

17. The system of claim 12, wherein the video signal received is part of a multimedia signal that is received in the cellular network communication.

18. The system of claim 12, wherein the alternative display terminal is an external display terminal.

19. The system of claim 12, wherein the alternative display terminal is an analog display device.

20. The system of claim 19, wherein the analog display device is a television set.

10

21. The system of claim 20, wherein the television set implements one or more of the following standards: NTSC, PAL or SECAM.

22. The system of claim 12, wherein the alternative display terminal is a digital display device.

23. An apparatus for processing signals to accommodate reproduction by an alternative display terminal, the apparatus comprising:

an interface module, which receives a video signal appropriate for displaying a video content on a mobile terminal, the video signal being received from a cellular network communication that is sent to the mobile terminal and then received by the interface module;

a signal conversion module, in operative communication with the interface module, which processes the video signal to produce a converted signal for use by the alternative display terminal, wherein processing by the signal conversion module includes converting the video signal from a compression format appropriate for the mobile terminal to a display format for the alternative display terminal that is different from the compression format, such that the converted video signal comprises a display format and a power level appropriate for driving the alternative display terminal; and

a device interface module, in operative communication with the signal conversion module, which provides the converted video signal to the alternative display terminal to accommodate displaying the video content by the alternative display terminal.

24. The apparatus of claim 23, wherein the mobile terminal is a cellular phone.

25. The apparatus of claim 23, wherein the mobile terminal is a personal digital assistant.

26. The apparatus of claim 23, wherein power to receive the video signal, process the video to produce the converted video signal, and provide the converted video signal to the alternative display terminal is from a source that differs from the internal power supply of the mobile terminal.

27. The apparatus of claim 23, wherein the apparatus resides in the alternative display terminal.

28. The apparatus of claim 23, wherein the video signal received is part of a multimedia signal that is received in the cellular network communication.

29. The apparatus of claim 23, wherein the alternative display terminal is an external display terminal.

30. The apparatus of claim 23, wherein the alternative display terminal is an analog display device.

31. The apparatus of claim 30, wherein the analog display device is a television set.

32. The apparatus of claim 31, wherein the television set implements one or more of the following standards: NTSC, PAL or SECAM.

33. The apparatus of claim 23, wherein the alternative display terminal is a digital display device.

* * * * *

EXHIBIT 2

US 8,050,711 B2

Page 2

U.S. PATENT DOCUMENTS

6,718,182	B1	4/2004	Kung	
6,781,635	B1 *	8/2004	Takeda	348/552
6,859,358	B2	2/2005	Baldwin et al.	
6,873,853	B2 *	3/2005	Kim	455/466
6,907,276	B2	6/2005	Toba	
6,970,127	B2 *	11/2005	Rakib	341/173
7,248,888	B2 *	7/2007	Inselberg	455/517
7,257,202	B2 *	8/2007	Umemura et al.	379/88.14
7,312,813	B1 *	12/2007	Heinonen	348/158
7,360,085	B2 *	4/2008	Loveria, III	713/165
7,899,492	B2 *	3/2011	Wang et al.	455/556.1
2002/0090980	A1 *	7/2002	Wilcox et al.	455/566
2002/0094826	A1	7/2002	Lee	
2002/0102998	A1 *	8/2002	Lin	455/466
2002/0137505	A1	9/2002	Eiche et al.	
2002/0137551	A1	9/2002	Toba	

2003/0054794	A1	3/2003	Zhang	
2003/0104806	A1 *	6/2003	Ruef et al.	455/422
2003/0130009	A1 *	7/2003	Kung	455/557
2004/0046783	A1	3/2004	Montebovi	
2004/0056985	A1	3/2004	Scong	
2004/0125136	A1	7/2004	Wallenius	
2004/0157642	A1	8/2004	Lee et al.	
2004/0177376	A1 *	9/2004	Caspi et al.	725/81
2004/0212731	A1 *	10/2004	Sie et al.	348/445
2005/0036509	A1 *	2/2005	Acharya et al.	370/466
2005/0085183	A1 *	4/2005	Lee	455/3.01
2005/0088463	A1	4/2005	Schilling	
2005/0144461	A1 *	6/2005	Takamatsuwa	713/182
2005/0144641	A1	6/2005	Lewis	
2006/0001737	A1 *	1/2006	Dawson et al.	348/14.08
2007/0287498	A1 *	12/2007	Wang et al.	455/556.1

* cited by examiner

U.S. Patent

Nov. 1, 2011

Sheet 1 of 7

US 8,050,711 B2

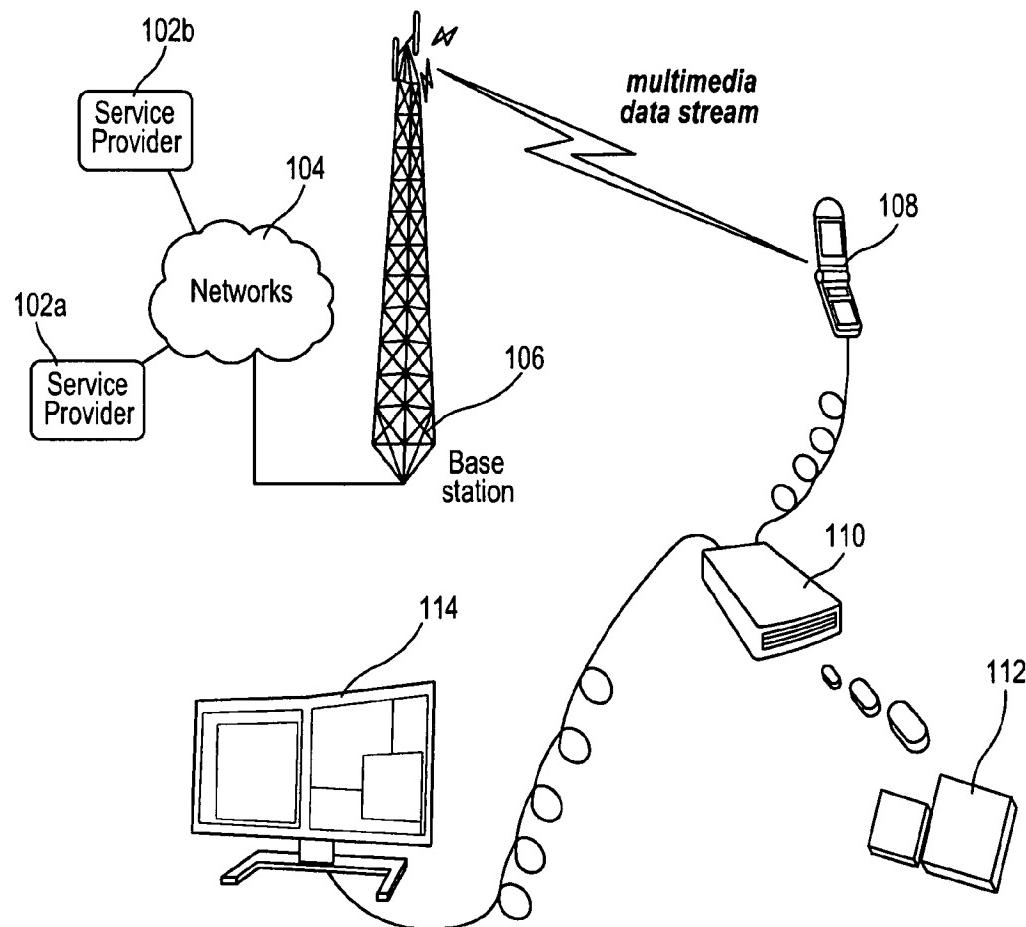
100

FIG. 1

U.S. Patent

Nov. 1, 2011

Sheet 2 of 7

US 8,050,711 B2

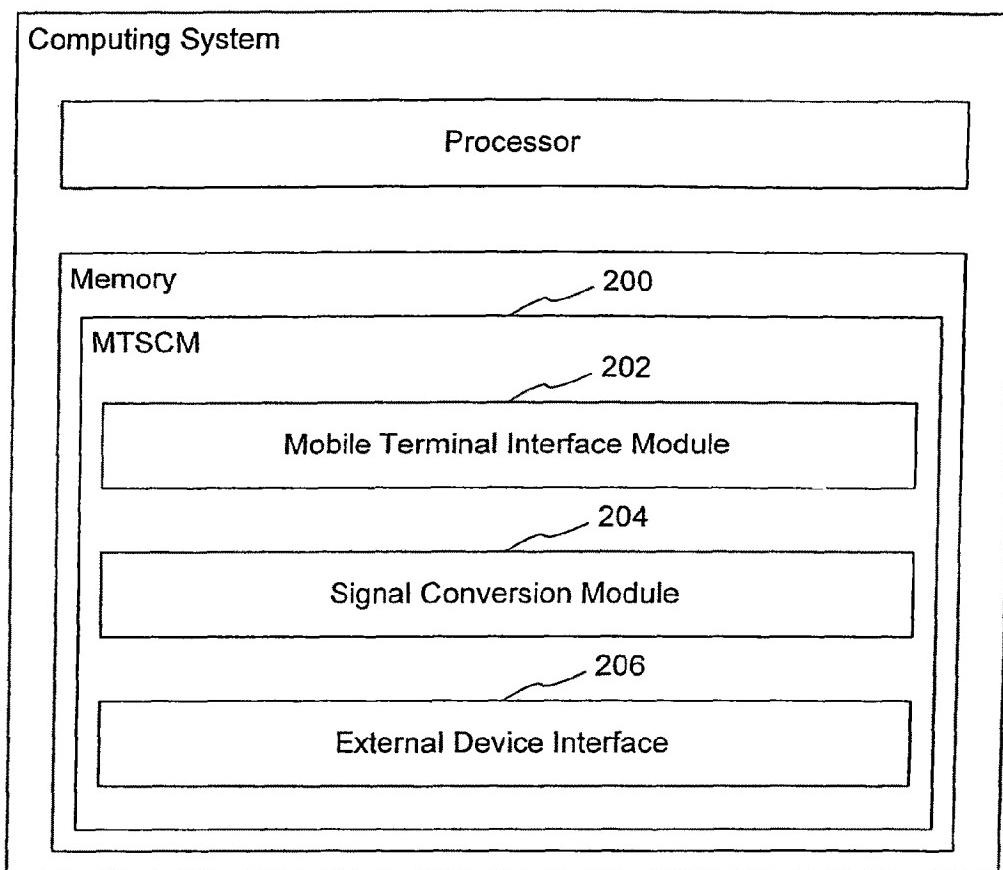


FIG. 2

U.S. Patent

Nov. 1, 2011

Sheet 3 of 7

US 8,050,711 B2

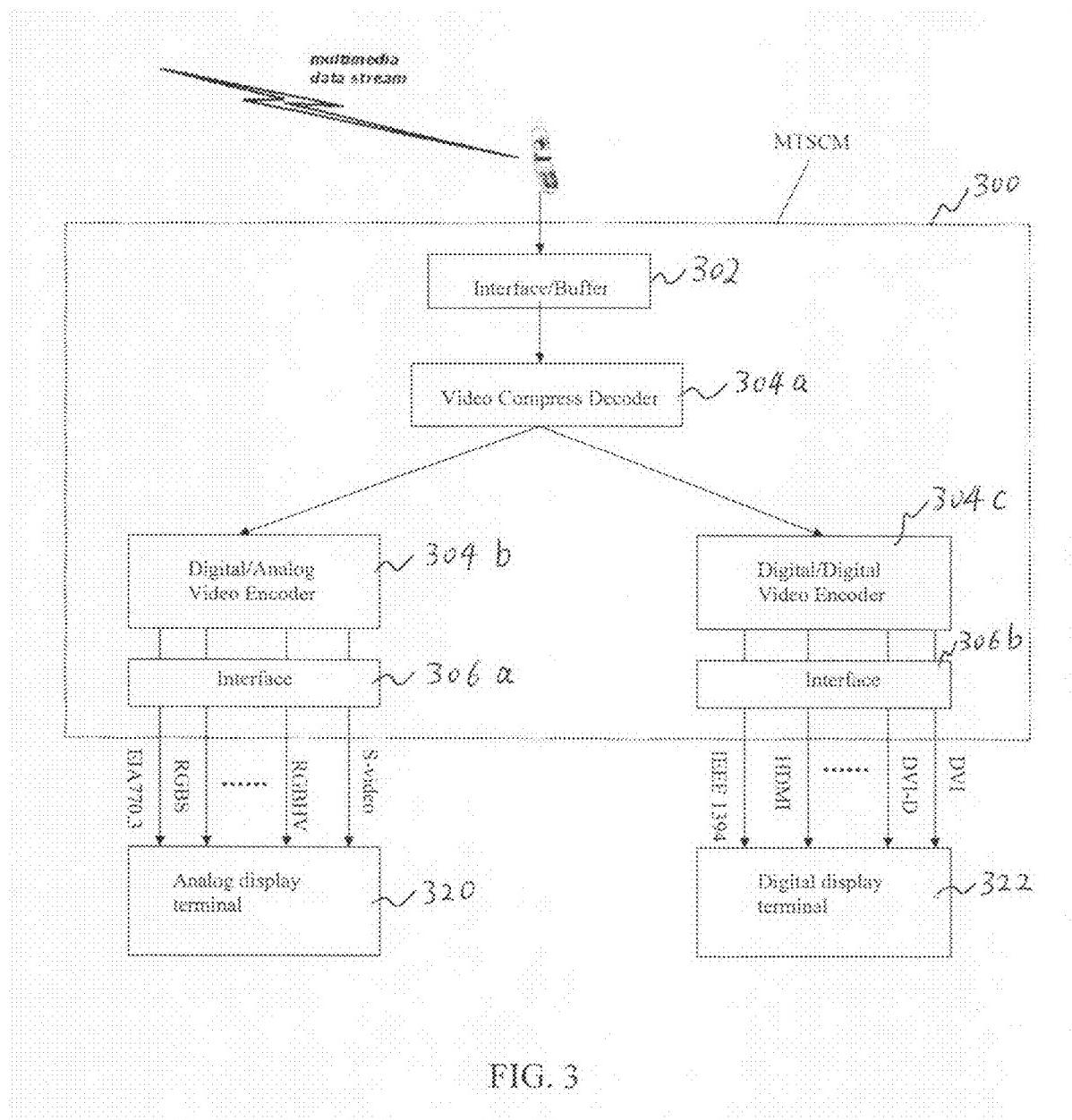


FIG. 3

U.S. Patent

Nov. 1, 2011

Sheet 4 of 7

US 8,050,711 B2

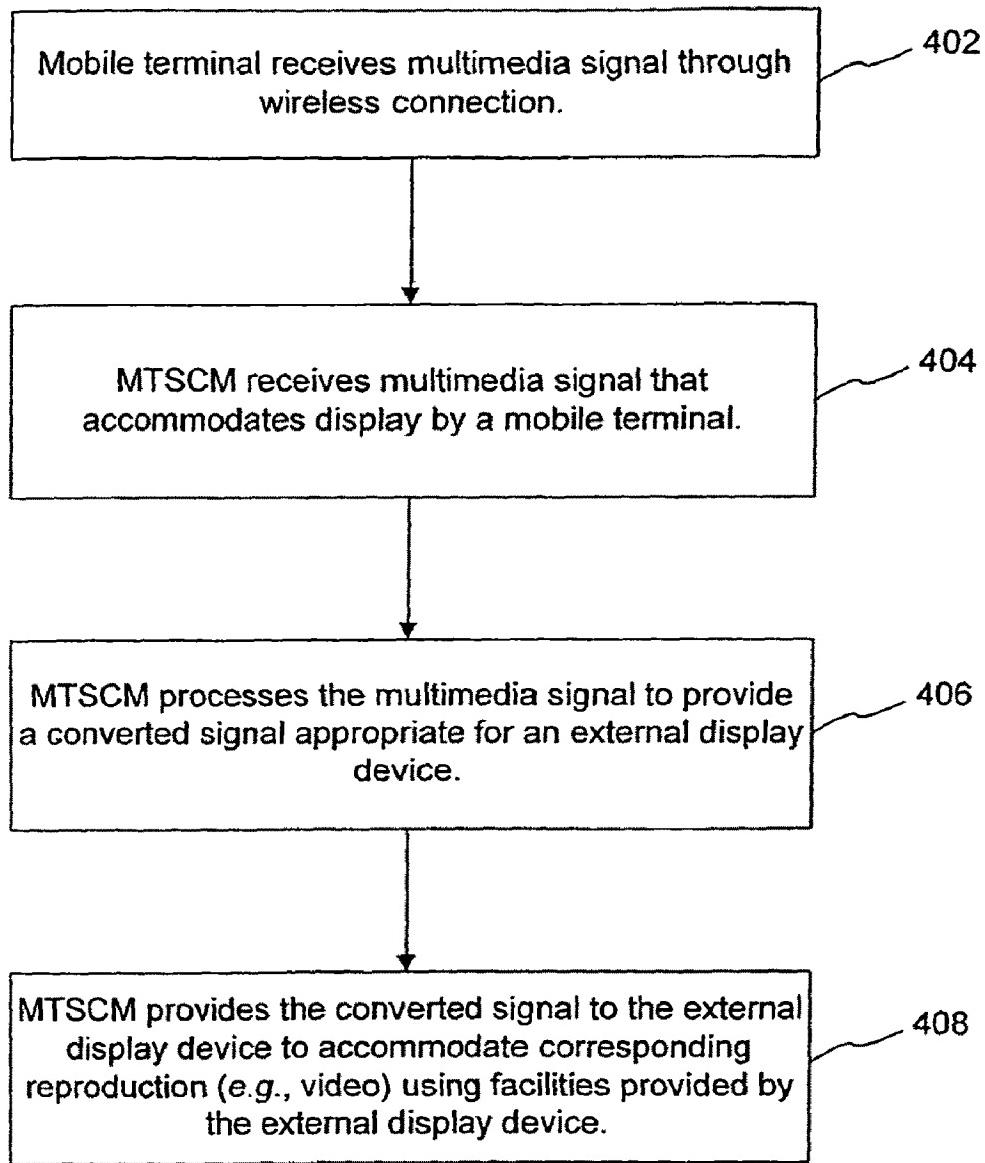


FIG. 4

U.S. Patent

Nov. 1, 2011

Sheet 5 of 7

US 8,050,711 B2

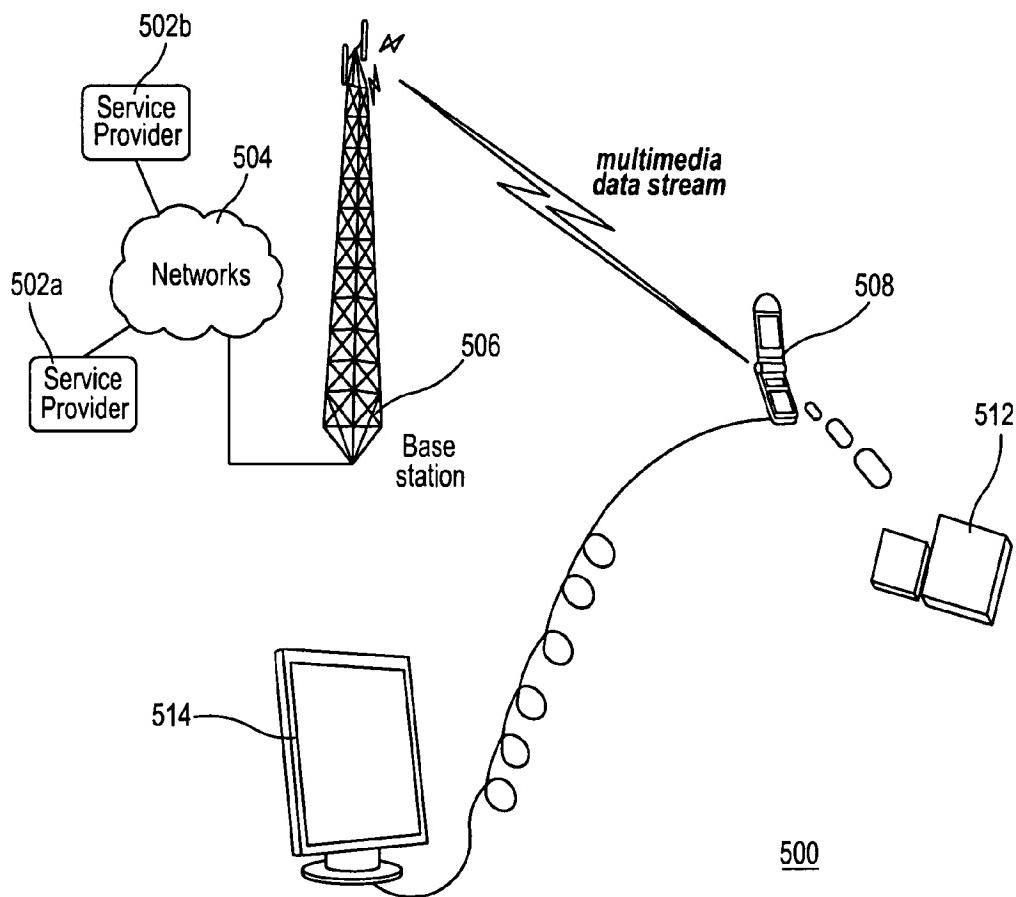


FIG. 5

U.S. Patent

Nov. 1, 2011

Sheet 6 of 7

US 8,050,711 B2

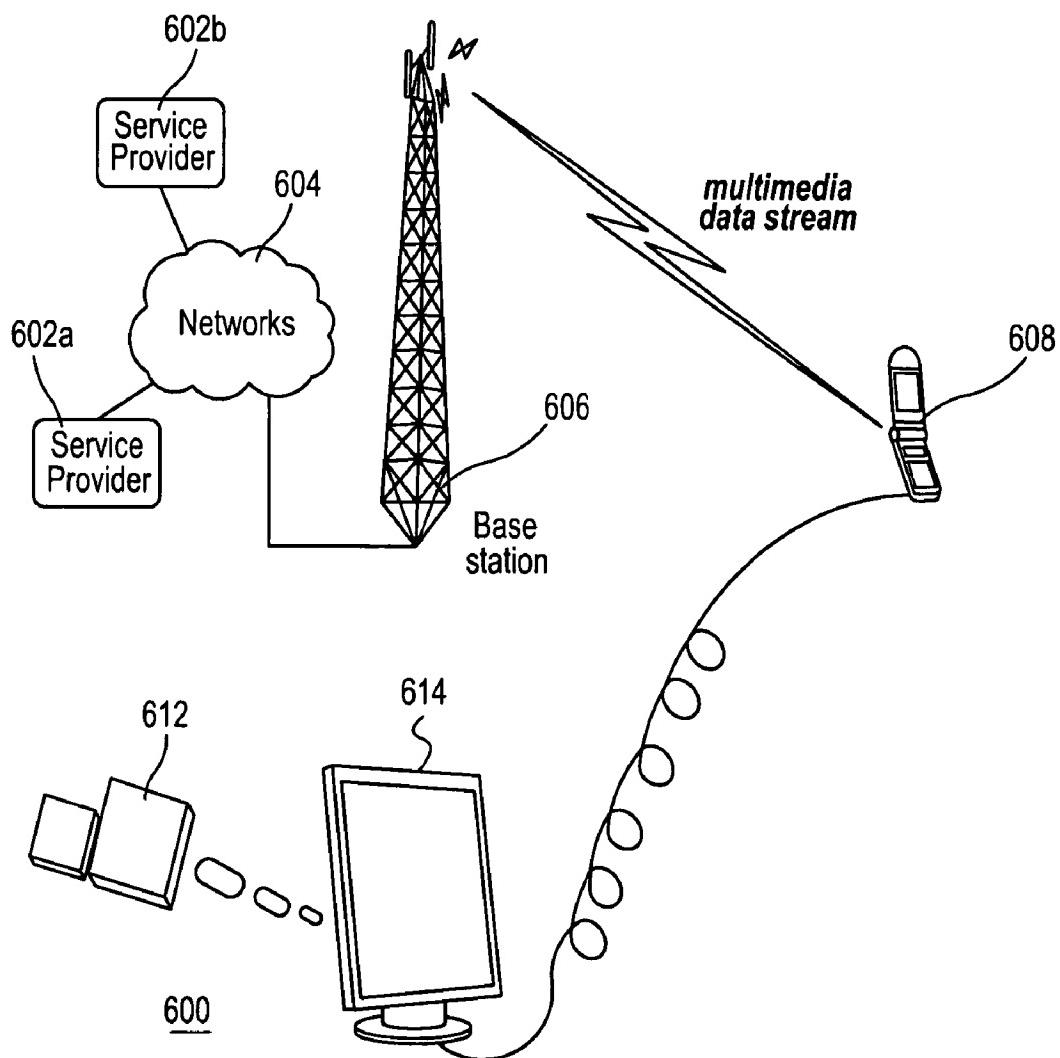


FIG. 6

U.S. Patent

Nov. 1, 2011

Sheet 7 of 7

US 8,050,711 B2

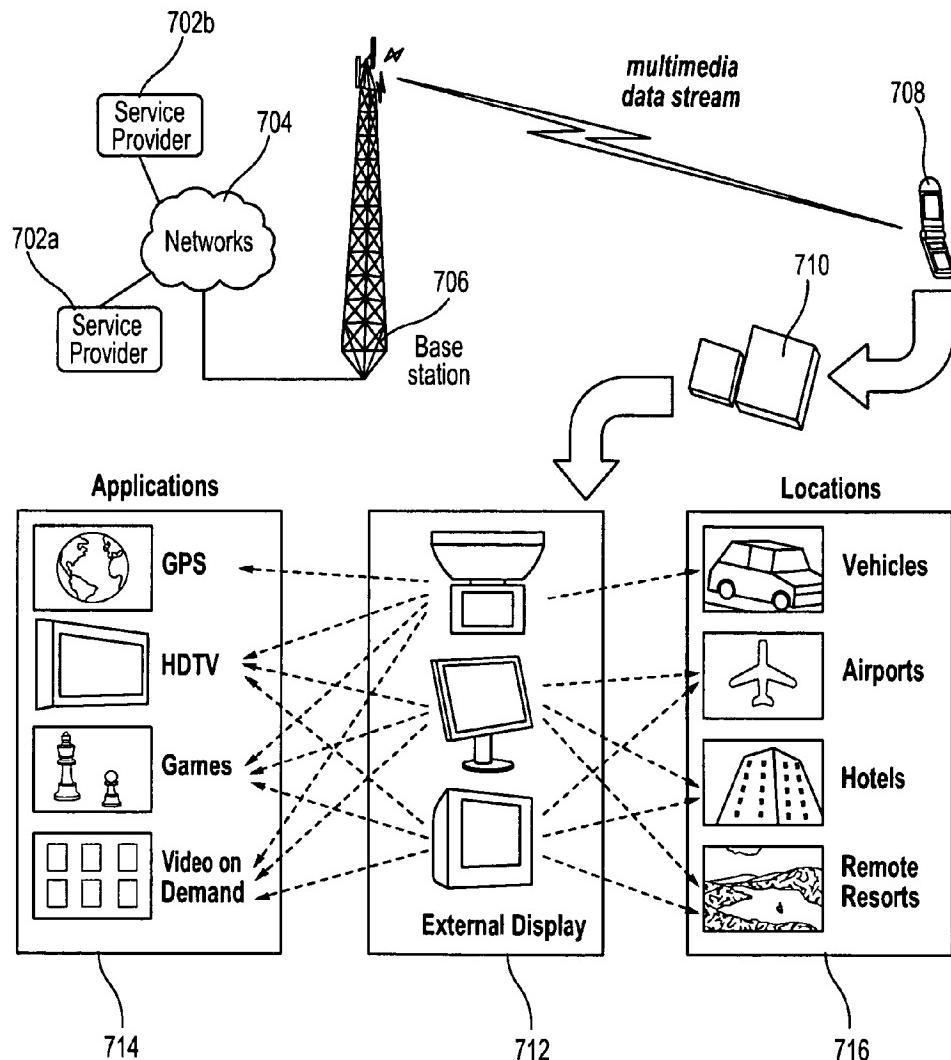


FIG. 7

US 8,050,711 B2

1

METHODS, SYSTEMS AND APPARATUS FOR DISPLAYING THE MULTIMEDIA INFORMATION FROM WIRELESS COMMUNICATION NETWORKS

CROSS REFERENCE TO RELATED APPLICATIONS

This application is a continuation of U.S. application Ser. No. 11/165,341, filed on Jun. 24, 2005 and entitled "Mobile Terminal Signal Conversion for External Display," which claims the benefit of provisional application Ser. No. 60/588,358, filed on Jul. 16, 2004 and entitled "A Method and System for Displaying the Multimedia Information from Wireless Communications or Portable IT Devices." The entire contents of these applications are hereby incorporated by reference.

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates generally to mobile terminals and related technology and more particularly to mobile terminal signal conversion for external display.

2. Description of the Related Art

Handheld mobile terminals (e.g., cellular phones, personal digital assistants (PDA)) continue to evolve both in terms of execution platform and functionality. It is believed that the much of the functionality provided by a personal computer (e.g., desktop or laptop) will ultimately become virtually available in handheld mobile terminals, which will allow users to work with and access multimedia information any time and anywhere.

For example, one particularly appealing advantage of the next generation wireless communication system and beyond (i.e., 3G, 4G, etc.) is the capacity to support high rate multimedia data services as well as conventional voice services. In a conventional cellular system a mobile terminal communicates with a base station wirelessly. Multimedia information including but not limited to television, 3D images, network games, and video phone calls is transmitted from various service providers and received for display on the screen of a mobile terminal. The net result of such a system is rich multimedia information being destined for display on the small screens typical of cellular phones (or the like).

In these and similar systems, the mobile terminal functions as a multimedia terminal to display multimedia information (including high-resolution graphics and high-quality real-time audio/video) sent from high data rate wireless communications network. The limited size (e.g., 2x3") and capability of the mobile terminal screen may render enjoyment of the high rate data flow applications inconvenient, and in some instances useless. One consequence of this inadequacy is likely shrinkage of the potential market size for handheld mobile terminals. Indeed, some have suggested that development of high data rate systems such as 3G systems may be pointless given the limitations imposed by the small screen.

Some mobile units appear to provide a remote control function to an external display system. However, these do not appear to solve the small screen problem outlined above. That is, they do not accommodate display on a larger, external display of video and other multimedia information originally destined for the mobile terminal display screen.

For example, one such interface accommodates usage of the mobile terminal as a remote control for a television, by feeding programming guide information to the mobile terminal. This is useful for allowing the programming guide to be

2

viewed locally while the larger screen displays a current program, but does not address the above-described small screen problem.

Although mobile terminals have been developed to include enhanced signal processing and related capabilities, user enjoyment is diminished by the limitations of the display provided with such mobile terminals. What is needed is a solution to the problem of diminished user enjoyment of mobile terminals because of display limitations.

SUMMARY OF THE INVENTION

In accordance with the present invention, the multimedia signal destined for the mobile terminal is converted and provided to an external display system, so that the corresponding video and/or audio may be reproduced using the external system.

It is believed that this feature will be useful in various environments, including but not limited to transportation environments such as planes, trains and automobiles; hotels; waiting areas; and any location where high data rate services can be more fully supported by external display terminals.

According to one aspect, processing signals for reproduction by an external display terminal includes receiving a video signal that accommodates a video display on a first screen provided by the mobile terminal. The video signal is then processed to provide a converted video signal appropriate for an external display terminal that is separate from the mobile terminal. This converted video signal is then provided for the external display terminal to accommodate the corresponding video display on a screen provided by the external display terminal.

The present invention can be embodied in various forms, including business processes, computer implemented methods, computer program products, computer systems and networks, user interfaces, application programming interfaces, and the like.

BRIEF DESCRIPTION OF THE DRAWINGS

These and other more detailed and specific features of the present invention are more fully disclosed in the following specification, reference being had to the accompanying drawings, in which:

FIG. 1 is a schematic diagram illustrating an example of a system in which mobile terminal signal conversion may reside in accordance with the present invention.

⁴⁵ FIG. 2 is a block diagram illustrating an example of a mobile terminal signal conversion module in accordance with the present invention.

FIG. 3 is a block diagram illustrating another example of a mobile terminal signal conversion module in accordance with the present invention.

FIG. 5 is a schematic diagram illustrating another example
of a system in which mobile terminal signal conversion may
reside in accordance with the present invention.

FIG. 6 is a schematic diagram illustrating still another example of a system in which mobile terminal signal conversion may reside in accordance with the present invention.

60 FIG. 7 is a schematic diagram illustrating examples of mobile terminal signal conversion applications in accordance with the present invention.

DETAILED DESCRIPTION OF THE INVENTION

In the following description, for purposes of explanation, numerous details are set forth, such as flowcharts and system

US 8,050,711 B2

3

configurations, in order to provide an understanding of one or more embodiments of the present invention. However, it is and will be apparent to one skilled in the art that these specific details are not required in order to practice the present invention.

FIG. 1 is a schematic diagram illustrating an example of a system 100 in which mobile terminal signal conversion may reside in accordance with the present invention.

Mobile terminal signal conversion accommodates displaying the high rate data flow multimedia information available in a wireless communication environment in an external device. This accommodates true realization and enjoyment of the benefits of the multimedia content.

In one example, the multimedia information is provided to a wireless mobile terminal using so-called next generation cellular technology (i.e., 3G and 4G), which can be employed in transmitting multimedia information (e.g., rich graphics, real-time audio/video). Because of the relatively small screen size and low quality ear phones, for many applications the mobile terminal cannot adequately reproduce the high quality multimedia information that can be communicated using next generation technology with adequate clarity and satisfaction. Mobile terminal signal conversion in accordance with this embodiment of the present invention makes usage of a separate multimedia display terminal including but not limited to a monitor, television set, projector, or LCD display. These displays typically have video and audio reproduction capabilities that are superior to those found on mobile terminals. They also use a power supply that is separate from the mobile terminal.

Still referring to the system 100 illustrated in FIG. 1, multimedia information may be provided by any number of service providers 102a-b and delivered through a network 104 to a base station 106 to ultimately accommodate transmission of the multimedia information, among other things, to a cellular phone 108. This system 100 is provided by way of example, and it should be understood that any conventional or to-be-developed technology for delivering voice and/or data to mobile terminals may be provided. These wireless communication networks include but are not limited to a cellular communications network or a wireless local area network.

Also illustrated is a typical external display system 114. This may also be variously provided and may be digital or analog. Examples of digital systems include HDTV, LCD and plasma. Examples of analog systems include television sets that implement standards such as NTSC, PAL, SECAM, and analog computer monitors (SVGA, VGA). The external display system 114 does not have the size constraints of the display screen on the cellular phone 108 and is preferably powered independently.

In the illustrated embodiment, a mobile terminal signal conversion module (MTSCM) 112 resides within a separate housing 110, outside the cellular phone 108.

The functionality of the MTSCM 112 is now further described with concurrent reference to FIG. 1 and the flow diagram of FIG. 4.

The MTSCM 112 processes signals to accommodate reproduction by an external device. Specifically, a multimedia signal is transmitted to the cellular phone 108 through the wireless communications network as previously described (step 402). The multimedia signal may include a video signal intended for reproduction by the cellular phone 108, using the cellular phone display screen. For ease of description, processing of a video signal is described, although it should be understood that any multimedia signal or component thereof may be converted in accordance with the present invention.

4

The cellular phone **108** is connected to the MTSCM **110**. This may be accommodated by a cable connection that interfaces the cellular phone **108** to the MTSCM **112** housing **110**. Through this connection, the MTSCM **112** receives the video signal from the cellular phone **108** (step **404**). The video signal as received may be configured to accommodate a video display on the screen provided by the cellular phone **108**. The cable connection is an example of a wired connection interfacing the cellular phone **108** to the MTSCM **112**. An alternative wired connection is a seat that directly interfaces the two without a cable. A wireless connection may also be provided, although it may currently be less practical to provide than the wired connection because of the potential for high throughput rate requirements. The wireless connection may also implement any conventional known technology including but not limited to a Bluetooth connection.

The MTSCM 112 processes the video signal to provide a converted video signal that has a display format and/or signal power level appropriate for an external display terminal 114 that is separate from the cellular phone 108 (step 406). The display format and/or signal power level of the external display terminal 114 may be different from that of the cellular phone 108 but there may also be embodiments where the format is the same. Even if the formats are the same, conversion of the signals to accommodate display on the external display terminal 114 would still be implemented to adjust the power level for driving the external display, and possibly to minimize throughput requirements. This signal conversion is described further with reference to FIGS. 2 and 3, below.

30 Still referring to FIGS. 1 and 4, following signal conversion, the MTSCM 112 provides the converted video signal to the external display terminal 114 to accommodate the corresponding video display on a screen provided by the external display terminal 114 (step 408). This may be accommodated
35 through a connection between the MTSCM 112 housing 110 and the external display terminal 114 as shown.

As used herein, mobile terminal refers to typically handheld mobile devices such as cellular phones and personal digital assistants. Although these devices include an execution platform as well as input and display capabilities, such devices are distinguished from personal computers, such as desktop or laptop computers, which are not designed for convenient handheld usage.

FIG. 2 is a block diagram illustrating an example of an MTSCM 200 in accordance with the present invention. The MTSCM 200 may be provided as software, firmware, hardware, or any combination thereof.

ware, or any combination thereof.

Where the MTSCM **200** is provided as software, it operates in the context of an execution platform. That is, the MTSCM **200** includes instructions that are stored in memory for execution by a processor. Any conventional or to-be-developed execution platform may be used. The processor, memory, and related elements such as a power supply are well known and need not be described herein to convey an understanding of the invention. Additionally, FIG. 2 illustrates one modular breakdown for the components of the MTSCM **200**. It should be understood that the described functionality may alternatively be provided by an MTSCM having fewer, greater, or differently named modules from those illustrated in the figure.

Additionally, although modules as shown to reside in a common location, it is noted that the functionality may reside in separate components of a system that includes a mobile terminal, an external monitor, and (optionally) an intermediate device housing the MTSCM and interfacing the mobile terminal and external monitor. In other words, the overall functionality of the MTSCM may be separated such that

US 8,050,711 B2

5

portions of the overall functionality are respectively provided by the mobile terminal, separate intermediate housing, and/or the external display device.

The MTSCM 200 may also be provided in the form of a chipset, configured for inclusion in a mobile terminal, dedicated separate signal conversion device, or external display terminal, and to provide the described mobile terminal signal conversion functionality.

The MTSCM 200 includes a mobile terminal interface module 202, a signal conversion module 204, and an external device interface module 206.

The mobile terminal interface module **202** accommodates receiving the multimedia signal from the mobile terminal. A conventional physical interface provides a connection between the MTSCM **200** and the mobile terminal through which the signals flow to the MTSCM **200**. The mobile terminal interface module **202** recognizes the multimedia signal and stores the signal for processing by the remaining modules. Buffering and the like may be implemented to accommodate storage and signal processing, as described further below.

The signal conversion module **204** is in communication with the mobile terminal interface module **202** and thus accesses the received multimedia signal. The signal conversion module **204** recognizes the multimedia signal format, and processes the multimedia signal to provide a converted signal. The converted signal may have a format and a signal power level that differs from the one used by the mobile terminal, as appropriate for one or more types of external devices to which the MTSCM **200** is connected. Various examples of the type of devices to which the MTSCM **200** may be connected are illustrated and described in connection with FIG. 3, below.

The external device interface **206** is in communication with the signal conversion module **204** and thus accesses the converted signal. The external device interface **206** also allows connection to the external (e.g., display) device. The external device interface **206** may provide both the feeding of the converted signal to the external device, and driving the external device. Alternatively, the external device interface **206** may merely feed the converted signal to the external device, with the external device including internal elements for driving its signal reproduction (e.g., display) facilities.

FIG. 3 is a block diagram illustrating another example of the MTSCM 300. The MTSCM 300 includes additional detail regarding the signal conversion aspect, and illustrates examples of differing types of external devices to which the MTSCM 300 may provide converted signals. The illustration and corresponding description are provided by way of example. Although numerous connections are illustrated, it should be understood that the present invention may be practiced in the context of providing as few as one, and as many as all of the listed connections. It should also be understood that there may be additional examples that are not listed herein, but which are encompassed by the teachings described herein.

The MTSCM 300 includes an interface/buffer module 302 that is analogous to the previously described mobile terminal interface module. The buffer and interfacing are configured to accommodate signal processing by the remaining elements in support of the requirements and expectations of users of the multimedia signal output (e.g., adequate buffering and processing rate to provide real time audio/video). The mobile terminal video compression format may of course vary, but currently the most likely format is MPEG-1 or MPEG-2. Buffering and throughput rate may also be provided as desired by the designer. Currently, it is believed that 200 Mb

6

is an adequate buffer size, although buffers of 500 Mb or more may of course be provided. Additionally, a throughput rate of approximately 10 Gb/s will be adequate for many current systems, but may be increased as demands and technology evolve.

The Video Compress Decoder 304a receives the multimedia signal. The multimedia signal is typically provided in a compressed format to accommodate increased signal transfer rates. An example of a compression scheme is that provided by one of the MPEG standards (e.g., MPEG-1, MPEG-2, MPEG-4). The Video Compress Decoder 304a is configured to include the appropriate compression/decompression (CODEC) module to accommodate decompression of the received multimedia signal. For example, where the compression scheme is MPEG, the Video Compress Decoder 304a includes an MPEG CODEC to accommodate processing of such multimedia signals.

As an alternative to provision of the Video Compress Decoder 304a in the MTSCM 300, the functionality may be provided within the cellular phone or other mobile terminal. However, this may be less practical because of the high bandwidth that would be required between the cellular phone and the MTSCM 300 to deliver the decompressed signal, and the corresponding likelihood of a larger buffer requirement for the MTSCM 300.

The Video Compress Decoder 304a outputs a decompressed digital multimedia signal that is passed to the Digital/Analog Video Encoder (DAVE) 304b and/or the Digital/Digital Video Encoder (DDVE) 304c. The DAVE 304b is configured to prepare signals for analog external display terminals 320, and the DDVE 304c is configured to prepare signals for digital external display terminals 322. The DAVE 304b and DDVE 304c respectively receive the decompressed multimedia signal and convert the signals to the format(s) and signal power level(s) required for the terminals to which they interface.

Examples of formats used by analog display terminals **320** include S-video, RGBHV, RGBS, and EIA770.3 as illustrated. Similarly, the DDVE **304c** provides output using standards such as DVI, DVI-D, HDMI, and IEEE1394. The signals respectively provided by the DAVE **304b** and DDVE **304c** are provided to the terminals through conventional interfaces **306a-b**. The DAVE **304b** functionality may be embodied as a video card that is configured accordingly. Examples **5** of video cards that may be configured to provide the described functionality include but are not limited to the Diamond Stealth S60, ASUS V9400-X, or RADEON 7000.

Ultimately, the signals are used to provide a display on the external display, as required according to the particular type of display. For example, the video data stream may be a digital RGB signal which represents the intensity of the red, green and blue light respectively at different position. This signal is converted to analog by a D/A converter. This converted analog signal is quantified to the voltage and format required by the standard, such as the input of cathode-ray-tube (CRT) monitor. This standard video signal will drive a set of electron guns, which produce a controlled stream of electrons to display of red, green and blue light respectively on a CRT screen. This is but one example and the present invention is not limited to a particular technology (e.g., CRT) for the external display.

As described, in one embodiment the MTSCM may be independently housed separately from both the mobile terminal and external display terminal, with respective connections 5 to the other devices to provide a system configuration that includes the three pieces of hardware (mobile terminal, conversion box, external display terminal). This configuration

US 8,050,711 B2

۷

provides the flexibility of allowing any standard mobile terminal and/or display to be potentially interface with the MTSCM without imposing constraints on the mobile terminal or external display terminal manufacturers. A possible drawback to this configuration is that additional hardware is introduced into the system.

In lieu of the three component system, the MTSCM may be located in either the mobile terminal or the external display. FIG. 5 is a schematic diagram illustrates an example of a system 500 in which the MTSCM mobile terminal signal conversion may reside within the mobile terminal 508. The components and functionality of the service providers 502a,b network 504 and base station 506 for delivering multimedia signals to the mobile terminal 508 is the same as for the analogous elements of FIG. 1 and need not be re-described. Similarly, the external display terminal 514 may be any of the various types named above.

The MTSCM 512 provides the same functionality described above. However, in contrast to residence in a separate housing, the MTSCM 512 is a component of the mobile terminal 508. A potential advantage of this system 500 is that, again, any standard equipment can serve as an external display terminal 514, without a constraint on the display manufacturer. Additionally, only a simple wired or wireless interface is required to connect the external display with the mobile terminal 508. This means, for example, that the user will not be required to carry a bulky conversion module in addition to their cellular phone.

A potential drawback to this system **500** is that the execution platform of the mobile terminal **508** may be designed to accommodate only traditional functionality, so for some systems it may be challenging to add the MTSCM functionality to the existing platform. Additionally, the MTSCM will consume power that may unduly exhaust the limited power supply offered by the mobile terminal **508** battery. It is useful for this embodiment to provide power to the mobile terminal **508** through the cable connection to the external display terminal **514**, but again this may require modification to the mobile terminal **508** as the existing charger interface may be insufficient.

FIG. 6 is a schematic diagram illustrating another example of a system 600, in which the MTSCM 612 resides within the external display terminal 614. As with FIG. 5, the components and functionality of the service providers 602a,b network 604 and base station 606 for delivering multimedia signals to the mobile terminal 608 is the same as for the analogous elements of FIG. 1 and need not be re-described.

Here, the mobile terminal **608** need only be connected directly to the external display terminal **614**. However, in lieu of having the MTSCM **612** functionality reside within the mobile terminal **608**, it is part of the external display terminal **614**. The power supply and execution platform issues associated with placing the MTSCM **614** in the mobile terminal are resolved with this system **600**, and any mobile terminal **608** can potentially be connected to any MTSCM-ready external display without requiring modification, other than provision of an output interface. A potential drawback of this configuration is that it adds a component to the standard external display terminal, and corresponding costs.

FIG. 7 is a schematic diagram illustrating examples of mobile terminal signal conversion applications 700 in accordance with the present invention. These applications 700 are provided by way of example, to give the reader an understanding of the potential contexts in which embodiments of the present invention may operate. The present invention is not limited to the disclosed applications, nor are all potential applications required for any given embodiment.

8

The basic architecture for provision of the wireless communications signal and corresponding multimedia signal is as described above for the service providers **702a-b**, network **704**, base station **706** and mobile terminal **708**. The MTSCM **710** may be separate or reside in the mobile terminal **708** or display terminal **712**. Examples of applications **714** where a larger screen and potentially superior audio may be enjoyed include video conference, HDTV, games, GPS, and video on demand. Additionally, embodiments of the present invention will accommodate enjoyment of full multimedia capability in locations **716** including vehicles, airports, hotels and remote resorts. Thus, for example, the present invention accommodates usage inside a vehicle, a plane or any type of transportation, enabling the passenger to browse the Internet, watch TV, play games, participate in a video conference or call, and work on all sorts of software with full functionality.

work on all sorts of software with the functionality.

Thus embodiments of the present invention produce and provide mobile terminal signal conversion. Although the present invention has been described in considerable detail, 20 with reference to certain embodiments thereof, the invention may be variously embodied without departing from the spirit or scope of the invention. Therefore, the following claims should not be limited to the description of the embodiments contained herein in any way.

25 The invention claimed is:

1. A method for processing signals to accommodate reproduction by an alternative display terminal, the method comprising: receiving, by a conversion device, a video signal appropriate for displaying a video content on a mobile terminal, the video signal being received by the conversion device from a cellular network communication that is sent to the mobile terminal and then received by the conversion device; processing, by the conversion device, the video signal to produce a converted video signal for use by the alternative display terminal, wherein processing by the conversion device includes converting the video signal from a compression format appropriate for the mobile terminal to a display format for the alternative display terminal that is different from the compression format, such that the converted video signal produced by the conversion device comprises the display format for the alternative display terminal; and providing the converted video signal from the conversion device to the alternative display terminal to accommodate displaying the video content by the alternative display terminal.

2. The method of claim 1, wherein the mobile terminal is a cellular phone.

3. The method of claim 1, wherein the mobile terminal is a personal digital assistant.

4. The method of claim 1, wherein receiving the video signal, processing the video signal to produce the converted video signal, and providing the converted video signal to the alternative display terminal is performed using power from a source that differs from an internal power supply of the mobile terminal.

5. The method of claim 1, wherein the conversion device resides in the alternative display terminal.

6. The method of claim 1, wherein the video signal received is part of a multimedia signal that is received in the cellular network communication.

7. The method of claim 1, wherein the alternative display terminal is an external display terminal.

8. A system for processing signals to accommodate reproduction by an alternative display terminal, the system comprising:
means for receiving a video signal appropriate for displaying a video content on a mobile terminal, the video signal being received from a cellular network commun-

US 8,050,711 B2

9

nication that is sent to the mobile terminal and then received by the means for receiving the video signal; means for processing the video signal to produce a converted video signal for use by the alternative display terminal, wherein processing by the means for processing the video signal includes converting the video signal from a compression format appropriate for the mobile terminal to a display format for the alternative display terminal that is different from the compression format, such that the converted video signal produced by the means for processing the video signal comprises the display format for the alternative display terminal; and means for providing the converted video signal to the alternative display terminal to accommodate displaying the video signal in the alternative display terminal.

9. The system of claim 8, wherein the mobile terminal is a cellular phone.

10. The system of claim 8, wherein the mobile terminal is a personal digital assistant.

11. The system of claim 8, wherein receiving the video signal, processing the video signal to produce the converted video signal, and providing the converted video signal to the alternative display terminal is performed using power from a source that differs from an internal power supply of the mobile terminal.

12. The system of claim 8, wherein the means for receiving the video signal, means for processing the video signal to produce the converted video signal, and means for providing the converted video signal to the display terminal reside in a conversion module within the alternative display terminal.

13. The system of claim 8, wherein the video signal received is part of a multimedia signal that is received in the cellular network communication.

14. The system of claim 8, wherein the alternative display terminal is an external display terminal.

15. An apparatus for processing signals to accommodate reproduction by an alternative display terminal, the apparatus comprising: an interface, which receives a video signal appropriate for displaying a video content on a mobile terminal, the video signal being received from a cellular network communication that is sent to the mobile terminal and then received by the interface; a signal conversion hardware component, in operative communication with the interface, which processes the video signal to produce a converted signal for use by the alternative display terminal, wherein processing by the signal

10

conversion hardware component includes converting the video signal from a compression format appropriate for the mobile terminal to a display format for the alternative display terminal that is different from the compression format, such that the converted video signal comprises the display format for the alternative display terminal; and a device interface, in operative communication with the signal conversion hardware component, which provides the converted video signal to the alternative display terminal to accommodate displaying the video content by the alternative display terminal.

16. The apparatus of claim 15, wherein the mobile terminal is a cellular phone.

17. The apparatus of claim 15, wherein the mobile terminal is a personal digital assistant.

15 **18.** The apparatus of claim 15, wherein power to receive the video signal, process the video signal to produce the converted video signal, and provide the converted video signal to the alternative display terminal is from a source that differs from an internal power supply of the mobile terminal.

20 19. The apparatus of claim 15, wherein the apparatus resides in the alternative display terminal.

20. The apparatus of claim 15, wherein the video signal received is part of a multimedia signal that is received in the cellular network communication.

21. A computer memory having program code stored thereon for processing signals to accommodate reproduction by an alternative display terminal, the program code executable by a processor to perform operations comprising:

30 receiving a video signal appropriate for displaying a video content on a mobile terminal, the video signal being received from a cellular network communication that is sent to the mobile terminal;

35 processing the video signal to produce a converted video signal for use by the alternative display terminal, wherein processing includes converting the video signal from a compression format appropriate for the mobile terminal to a display format for the alternative display terminal that is different from the compression format, such that the converted video signal comprises the display format for the alternative display terminal; and

40 providing the converted video signal to the alternative display terminal to accommodate displaying the video content by the alternative display terminal.

* * * *

EXHIBIT 3

(12) United States Patent
Wang et al.(10) Patent No.: US 8,145,268 B1
(45) Date of Patent: *Mar. 27, 2012(54) METHODS, SYSTEMS AND APPARATUS FOR
DISPLAYING THE MULTIMEDIA
INFORMATION FROM WIRELESS
COMMUNICATION NETWORKS(75) Inventors: **Tiejun Wang**, La Jolla, CA (US);
William E. Halal, Washington, DC
(US); **Tiehong Ann Wang**, Arlington,
VA (US); **Ximing Wang**, Beijing (CN)(73) Assignee: **SellerBid, Inc.**, Arlington, VA (US)(*) Notice: Subject to any disclaimer, the term of this
patent is extended or adjusted under 35
U.S.C. 154(b) by 0 days.This patent is subject to a terminal dis-
claimer.

(21) Appl. No.: 13/268,001

(22) Filed: Oct. 7, 2011

Related U.S. Application Data(63) Continuation of application No. 12/929,408, filed on
Jan. 21, 2011, now Pat. No. 8,050,711, which is a
continuation of application No. 11/165,341, filed on
Jun. 24, 2005, now Pat. No. 7,899,492.(60) Provisional application No. 60/588,358, filed on Jul.
16, 2004.(51) Int. Cl.
H04M 1/00 (2006.01)
H04B 1/38 (2006.01)(52) U.S. Cl. **455/556.1; 455/566**(58) Field of Classification Search **455/500,**
455/418-420, 3,06, 566, 557, 556.1, 66.1,
455/414.1; 375/240.01, 240.02, 240.18;
348/14.07, 14.12, 14.13, 384.1, 441

See application file for complete search history.

(56)

References Cited

U.S. PATENT DOCUMENTS

4,740,963 A	4/1988	Eckley
5,610,971 A	3/1997	Vandivier
5,880,732 A	3/1999	Tryding
6,128,509 A	10/2000	Veijola et al.
6,181,954 B1	1/2001	Monroe et al.
6,275,333 B1	8/2001	Shaffer
6,404,763 B1	6/2002	Renucci et al.
6,546,263 B1	4/2003	Petty et al.
6,690,417 B1	2/2004	Yoshida et al.
6,718,182 B1	4/2004	Kung
6,781,635 B1	8/2004	Takeda
6,859,358 B2	2/2005	Baldwin et al.

(Continued)

FOREIGN PATENT DOCUMENTS

EA 1429511 6/2004

OTHER PUBLICATIONS

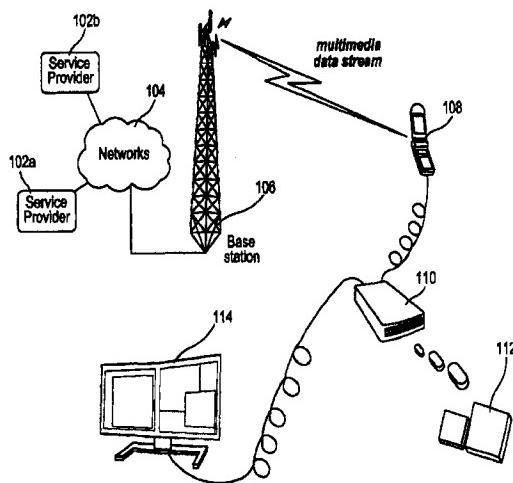
Notification of Transmittal of the International Search Report and the
Written Opinion of the International Searching Authority, or the
Declaration; International Application No. PCT/US05/25284; Filing
Date: Jul. 15, 2005.

Primary Examiner — Brandon Miller

(74) Attorney, Agent, or Firm — Rader, Fishman & Grauer
PLLC(57) **ABSTRACT**

Video signals for a mobile terminal are converted to accommodate reproduction by an alternative display terminal. The video signal is processed to provide a converted video signal appropriate for an alternative display terminal that is separate from the mobile terminal. This converted video signal is then provided for the alternative display terminal to accommodate the corresponding video display on a screen provided by the alternative (e.g., external) display terminal.

29 Claims, 7 Drawing Sheets



US 8,145,268 B1

Page 2

U.S. PATENT DOCUMENTS

6,873,853	B2	3/2005	Kim	2003/0054794	A1	3/2003	Zhang
6,907,276	B2	6/2005	Toba	2003/0104806	A1	6/2003	Ruef et al.
6,970,127	B2	11/2005	Rakib	2003/0130009	A1	7/2003	Kung
7,248,888	B2	7/2007	Inselberg	2004/0046783	A1	3/2004	Montebovi
7,257,202	B2	8/2007	Umemura et al.	2004/0056985	A1	3/2004	Scong
7,312,813	B1	12/2007	Heinonen	2004/0125136	A1	7/2004	Wallenius
7,360,085	B2	4/2008	Loveria, III	2004/0157642	A1	8/2004	Lee et al.
7,460,175	B2 *	12/2008	Young et al.	2004/0177376	A1	9/2004	Caspi et al.
7,899,492	B2 *	3/2011	Wang et al.	2004/0212731	A1	10/2004	Sie et al.
8,050,711	B2 *	11/2011	Wang et al.	2005/0036509	A1	2/2005	Acharya et al.
2002/0090980	A1	7/2002	Wilcox et al.	2005/0085183	A1	4/2005	Lee
2002/0094826	A1	7/2002	Lee	2005/0088463	A1	4/2005	Schilling
2002/0102998	A1	8/2002	Lin	2005/0144641	A1	6/2005	Lewis
2002/0137505	A1	9/2002	Eiche et al.	2006/0001737	A1	1/2006	Dawson et al.
2002/0137551	A1	9/2002	Toba	2007/0287498	A1	12/2007	Wang et al.

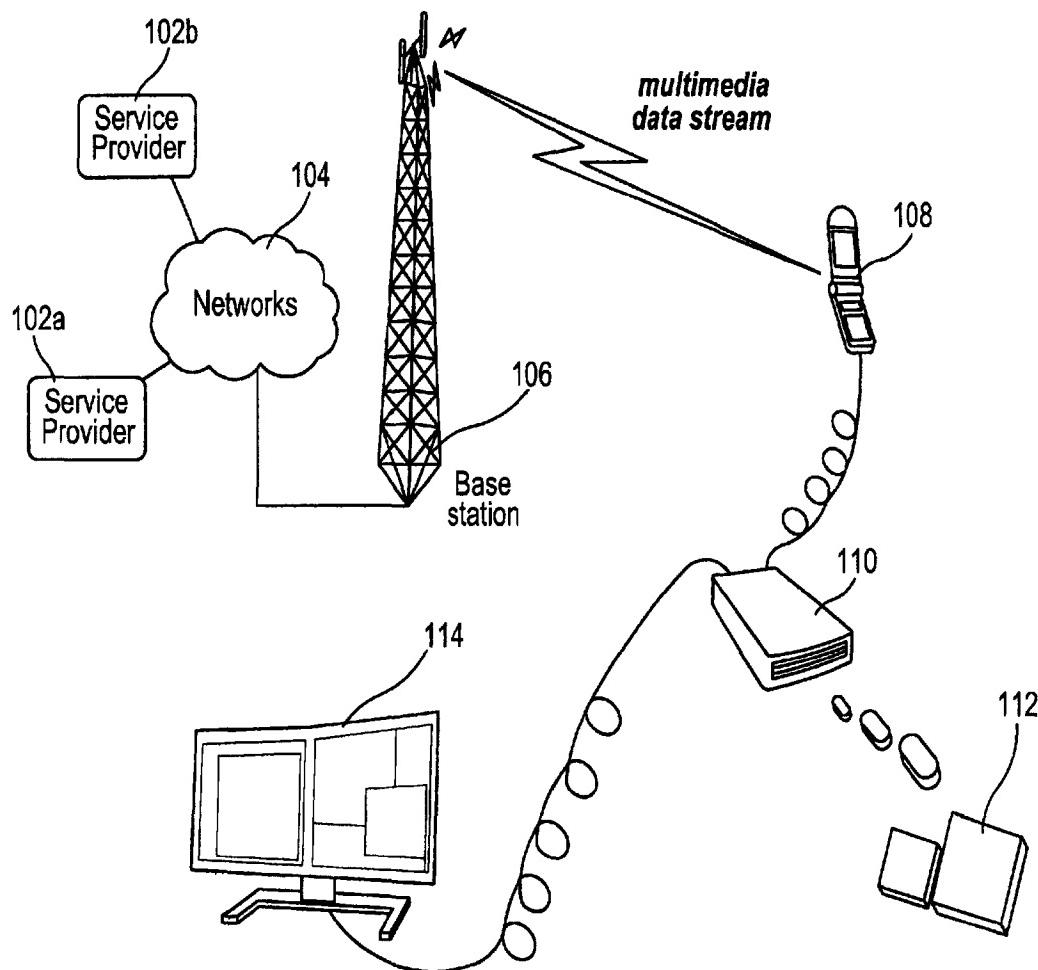
* cited by examiner

U.S. Patent

Mar. 27, 2012

Sheet 1 of 7

US 8,145,268 B1



100

FIG. 1

U.S. Patent

Mar. 27, 2012

Sheet 2 of 7

US 8,145,268 B1

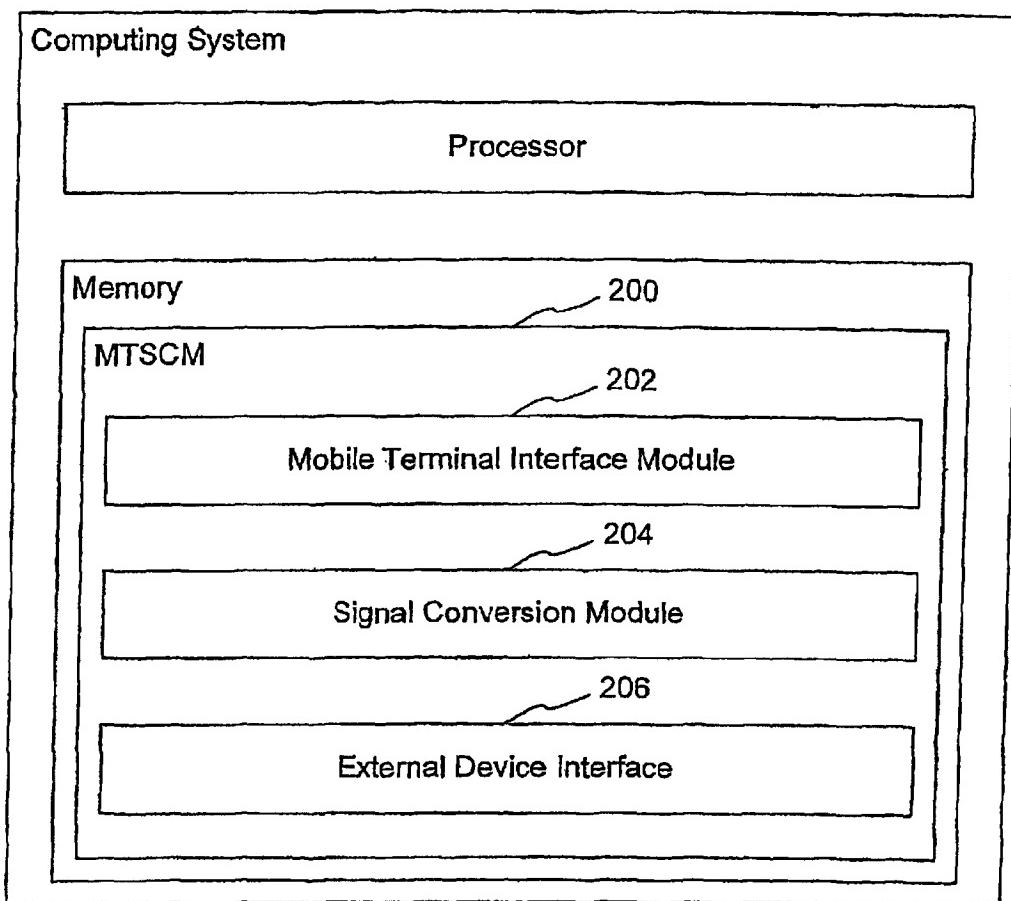


FIG. 2

U.S. Patent

Mar. 27, 2012

Sheet 3 of 7

US 8,145,268 B1

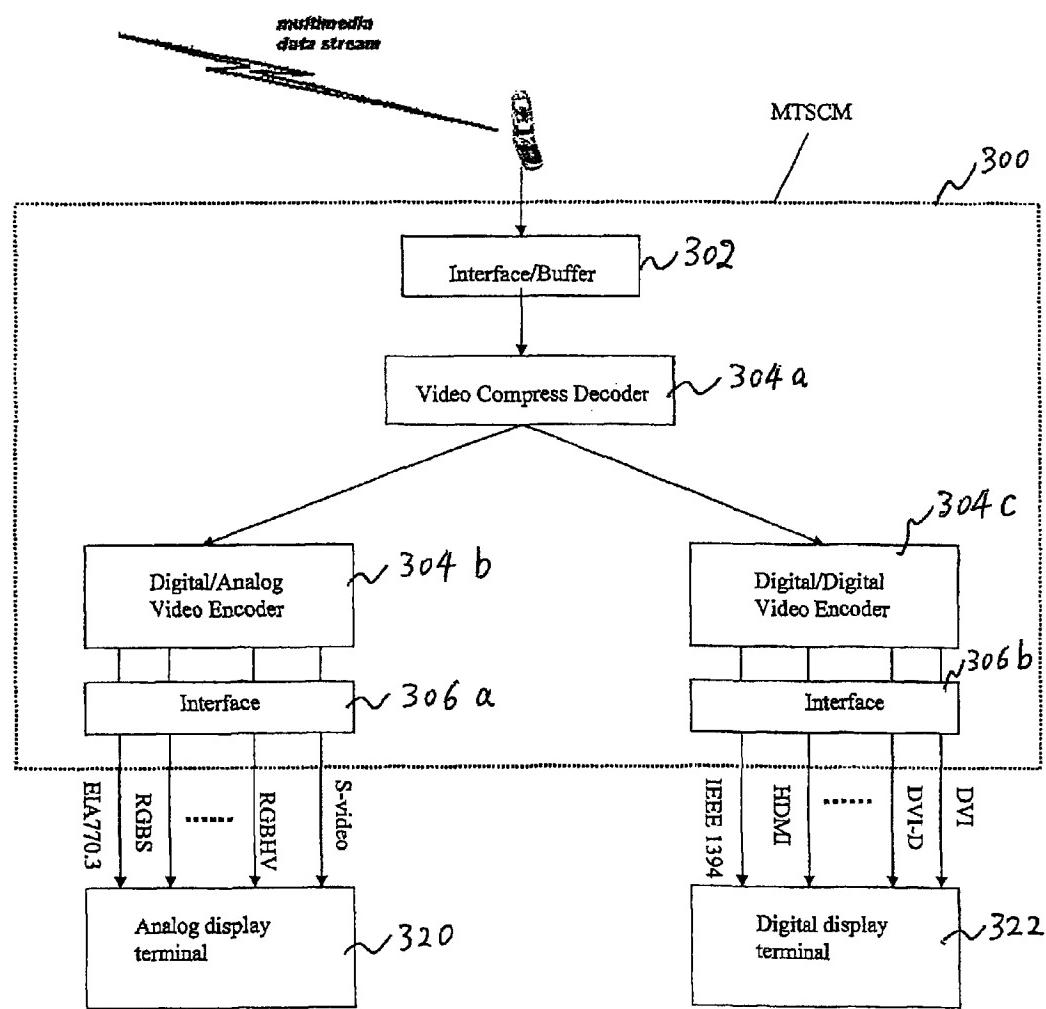


FIG. 3

U.S. Patent

Mar. 27, 2012

Sheet 4 of 7

US 8,145,268 B1

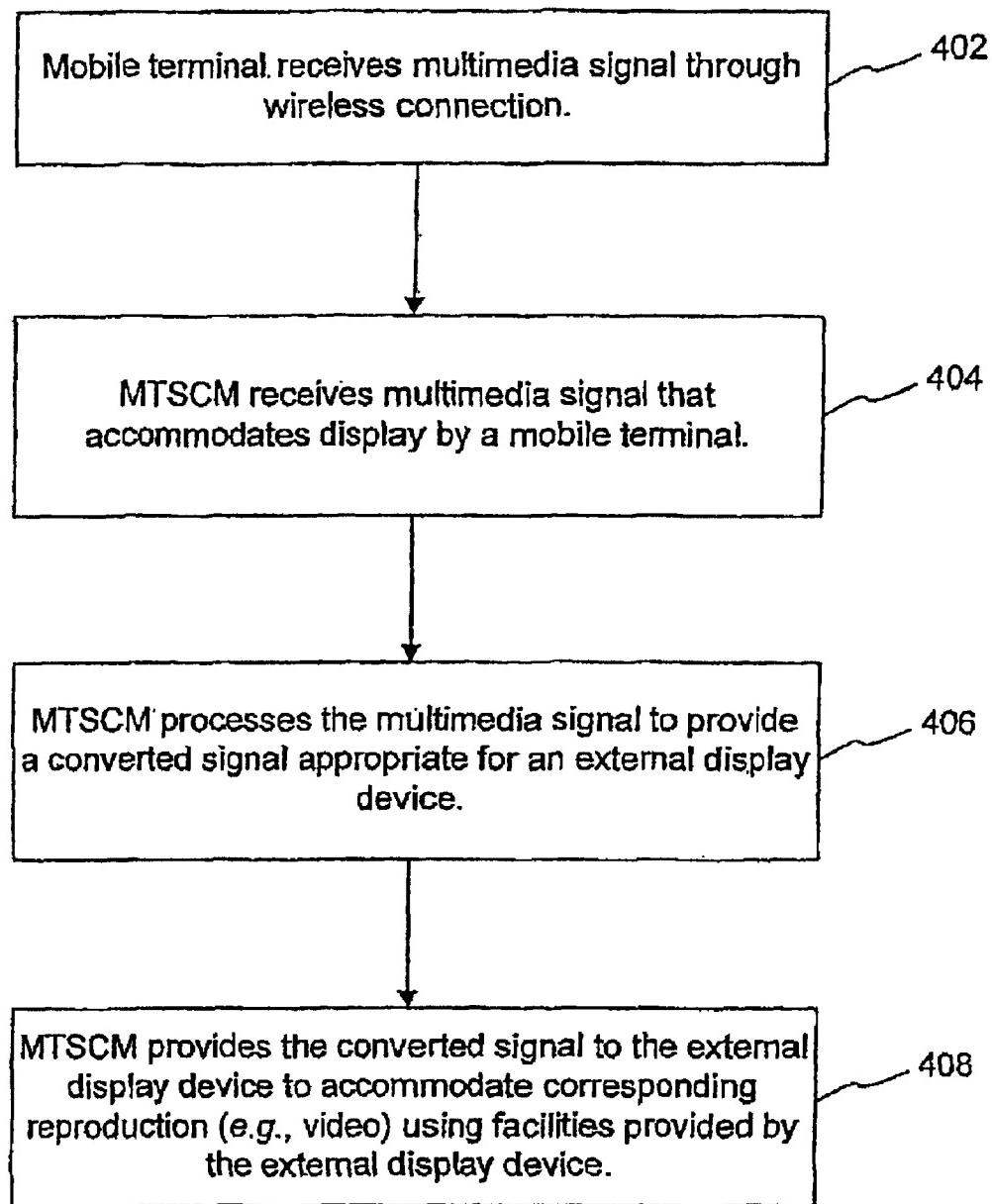


FIG. 4

U.S. Patent

Mar. 27, 2012

Sheet 5 of 7

US 8,145,268 B1

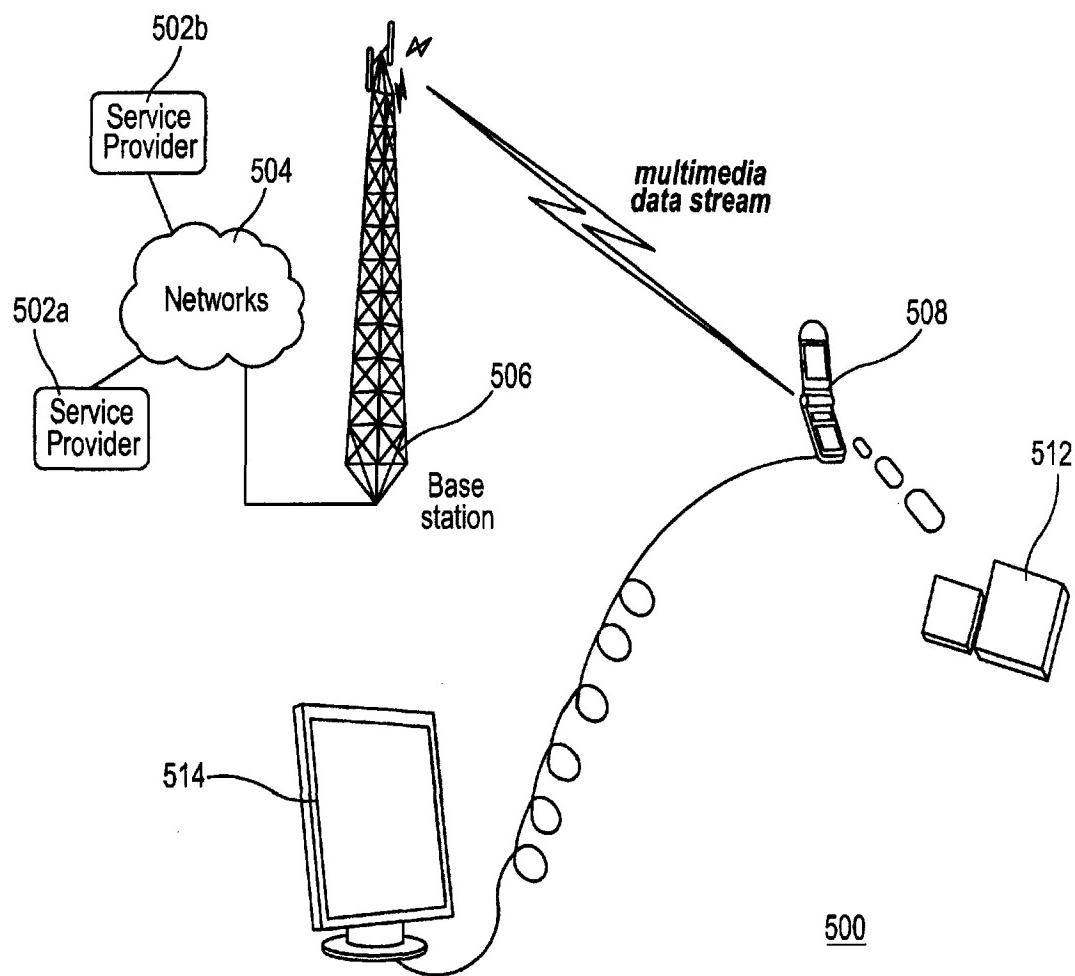


FIG. 5

U.S. Patent

Mar. 27, 2012

Sheet 6 of 7

US 8,145,268 B1

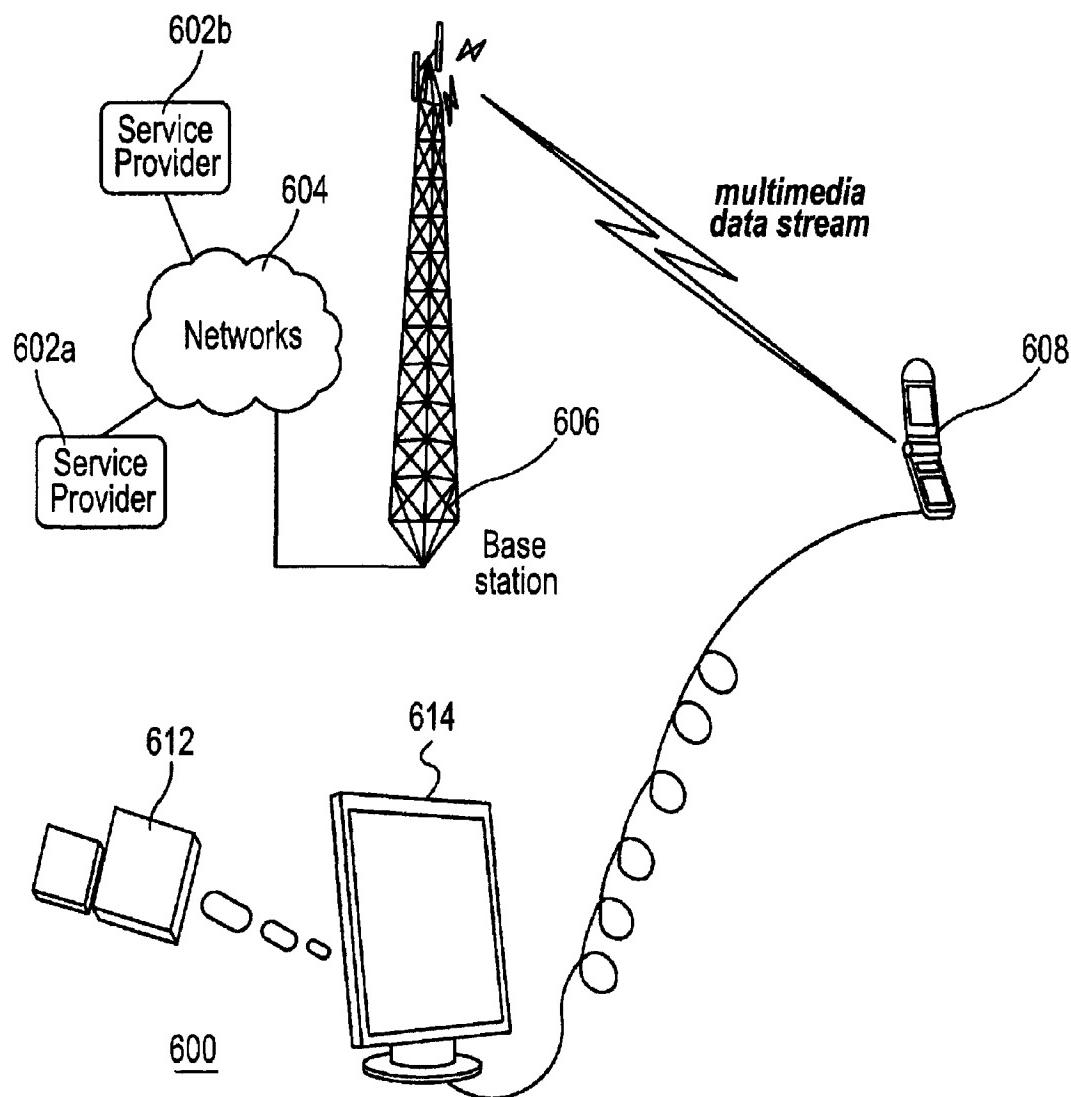


FIG. 6

U.S. Patent

Mar. 27, 2012

Sheet 7 of 7

US 8,145,268 B1

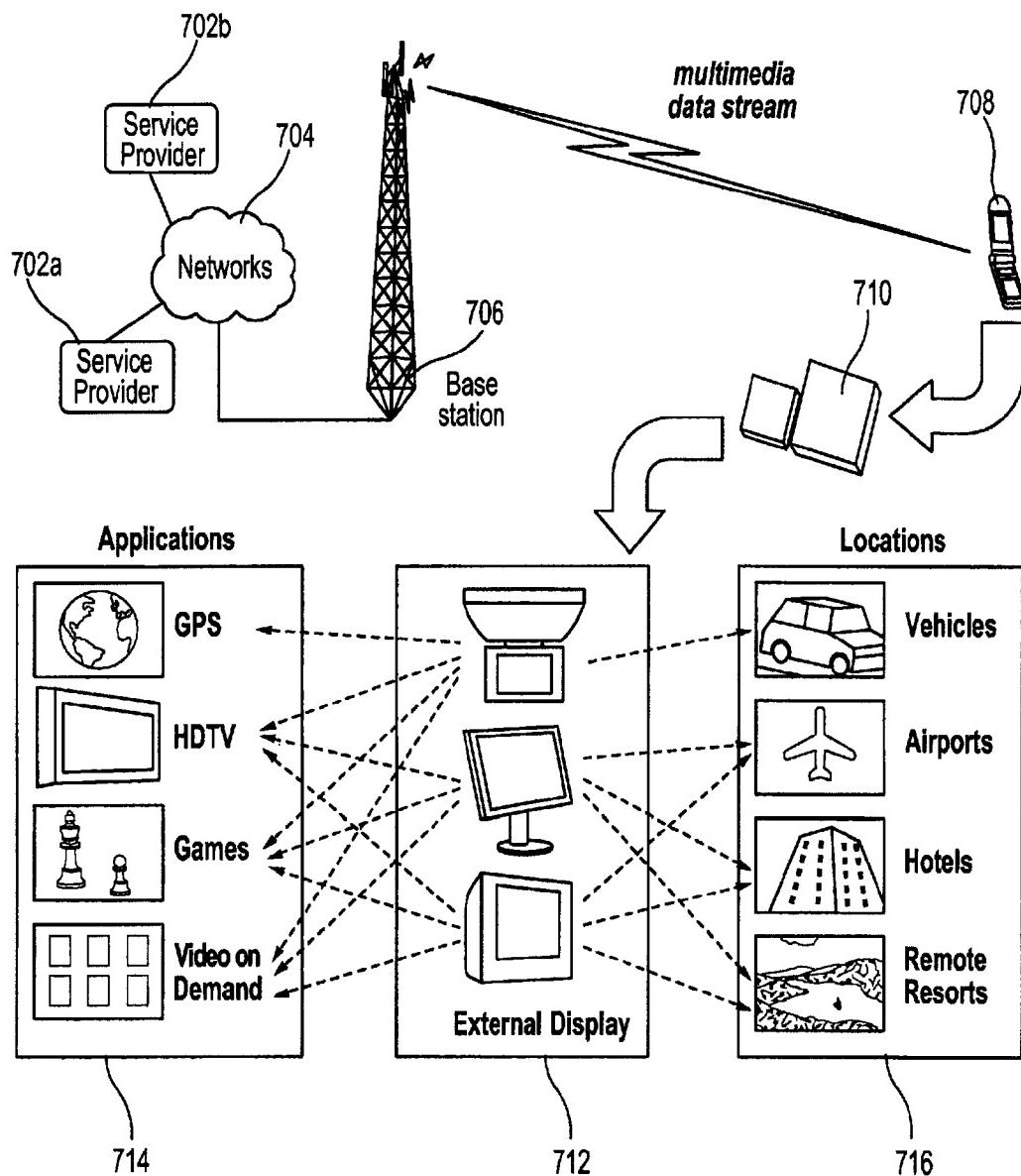


FIG. 7

US 8,145,268 B1

1

**METHODS, SYSTEMS AND APPARATUS FOR
DISPLAYING THE MULTIMEDIA
INFORMATION FROM WIRELESS
COMMUNICATION NETWORKS**

**CROSS REFERENCE TO RELATED
APPLICATIONS**

This application is a continuation of U.S. application Ser. No. 12/929,408, filed on Jan. 21, 2011, which is a continuation of U.S. application Ser. No. 11/165,341, filed on Jun. 24, 2005, now U.S. Pat. No. 7,899,492, issued Mar. 1, 2011 and entitled "Mobile Terminal Signal Conversion for External Display," which claims the benefit of provisional application Ser. No. 60/588,358, filed on Jul. 16, 2004 and entitled "A Method and System for Displaying the Multimedia Information from Wireless Communications or Portable IT Devices." The entire contents of these applications are hereby incorporated by reference.

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates generally to mobile terminals and related technology and more particularly to mobile terminal signal conversion for external display.

2. Description of the Related Art

Handheld mobile terminals (e.g., cellular phones, personal digital assistants (PDA)) continue to evolve both in terms of execution platform and functionality. It is believed that the much of the functionality provided by a personal computer (e.g., desktop or laptop) will ultimately become virtually available in handheld mobile terminals, which will allow users to work with and access multimedia information any time and anywhere.

For example, one particularly appealing advantage of the next generation wireless communication system and beyond (i.e., 3G, 4G, etc.) is the capacity to support high rate multimedia data services as well as conventional voice services. In a conventional cellular system a mobile terminal communicates with a base station wirelessly. Multimedia information including but not limited to television, 3D images, network games, and video phone calls is transmitted from various service providers and received for display on the screen of a mobile terminal. The net result of such a system is rich multimedia information being destined for display on the small screens typical of cellular phones (or the like).

In these and similar systems, the mobile terminal functions as a multimedia terminal to display multimedia information (including high-resolution graphics and high-quality real-time audio/video) sent from high data rate wireless communications network. The limited size (e.g., 2×3") and capability of the mobile terminal screen may render enjoyment of the high rate data flow applications inconvenient, and in some instances useless. One consequence of this inadequacy is likely shrinkage of the potential market size for handheld mobile terminals. Indeed, some have suggested that development of high data rate systems such as 3G systems may be pointless given the limitations imposed by the small screen.

Some mobile units appear to provide a remote control function to an external display system. However, these do not appear to solve the small screen problem outlined above. That is, they do not accommodate display on a larger, external display of video and other multimedia information originally destined for the mobile terminal display screen.

For example, one such interface accommodates usage of the mobile terminal as a remote control for a television, by

2

feeding programming guide information to the mobile terminal. This is useful for allowing the programming guide to be viewed locally while the larger screen displays a current program, but does not address to the above-described small screen problem.

Although mobile terminals have been developed to include enhanced signal processing and related capabilities, user enjoyment is diminished by the limitations of the display provided with such mobile terminals. What is needed is a solution to the problem of diminished user enjoyment of mobile terminals because of display limitations.

SUMMARY OF THE INVENTION

15 In accordance with the present invention, the multimedia signal destined for the mobile terminal is converted and provided to an external display system, so that the corresponding video and/or audio may be reproduced using the external system.

20 It is believed that this feature will be useful in various environments, including but not limited to transportation environments such as planes, trains and automobiles; hotels; waiting areas; and any location where high data rate services can be more fully supported by external display terminals.

25 According to one aspect, processing signals for reproduction by an external display terminal includes receiving a video signal that accommodates a video display on a first screen provided by the mobile terminal. The video signal is then processed to provide a converted video signal appropriate for 30 an external display terminal that is separate from the mobile terminal. This converted video signal is then provided for the external display terminal to accommodate the corresponding video display on a screen provided by the external display terminal.

35 The present invention can be embodied in various forms, including business processes, computer implemented methods, computer program products, computer systems and networks, user interfaces, application programming interfaces, and the like.

BRIEF DESCRIPTION OF THE DRAWINGS

These and other more detailed and specific features of the present invention are more fully disclosed in the following 45 specification, reference being had to the accompanying drawings, in which:

FIG. 1 is a schematic diagram illustrating an example of a system in which mobile terminal signal conversion may reside in accordance with the present invention.

50 FIG. 2 is a block diagram illustrating an example of a mobile terminal signal conversion module in accordance with the present invention.

FIG. 3 is a block diagram illustrating another example of a mobile terminal signal conversion module in accordance with the present invention.

55 FIG. 4 is a flow diagram illustrating an embodiment of a process including mobile terminal signal conversion in accordance with the present invention.

FIG. 5 is a schematic diagram illustrating another example 60 of a system in which mobile terminal signal conversion may reside in accordance with the present invention.

FIG. 6 is a schematic diagram illustrating still another example of a system in which mobile terminal signal conversion may reside in accordance with the present invention.

65 FIG. 7 is a schematic diagram illustrating examples of mobile terminal signal conversion applications in accordance with the present invention.

US 8,145,268 B1

3

DETAILED DESCRIPTION OF THE INVENTION

In the following description, for purposes of explanation, numerous details are set forth, such as flowcharts and system configurations, in order to provide an understanding of one or more embodiments of the present invention. However, it is and will be apparent to one skilled in the art that these specific details are not required in order to practice the present invention.

FIG. 1 is a schematic diagram illustrating an example of a system 100 in which mobile terminal signal conversion may reside in accordance with the present invention.

Mobile terminal signal conversion accommodates displaying the high rate data flow multimedia information available in a wireless communication environment in an external device. This accommodates true realization and enjoyment of the benefits of the multimedia content.

In one example, the multimedia information is provided to a wireless mobile terminal using so-called next generation cellular technology (i.e., 3G and 4G), which can be employed in transmitting multimedia information (e.g., rich graphics, real-time audio/video). Because of the relatively small screen size and low quality ear phones, for many applications the mobile terminal cannot adequately reproduce the high quality multimedia information that can be communicated using next generation technology with adequate clarity and satisfaction. Mobile terminal signal conversion in accordance with this embodiment of the present invention makes usage of a separate multimedia display terminal including but not limited to a monitor, television set, projector, or LCD display. These displays typically have video and audio reproduction capabilities that are superior to those found on mobile terminals. They also use a power supply that is separate from the mobile terminal.

Still referring to the system 100 illustrated in FIG. 1, multimedia information may be provided by any number of service providers 102a-b and delivered through a network 104 to a base station 106 to ultimately accommodate transmission of the multimedia information, among other things, to a cellular phone 108. This system 100 is provided by way of example, and it should be understood that any conventional or to-be-developed technology for delivering voice and/or data to mobile terminals may be provided. These wireless communication networks include but are not limited to a cellular communications network or a wireless local area network.

Also illustrated is a typical external display system 114. This may also be variously provided and may be digital or analog. Examples of digital systems include HDTV, LCD and plasma. Examples of analog systems include television sets that implement standards such as NTSC, PAL, SECAM, and analog computer monitors (SVGA, VGA). The external display system 114 does not have the size constraints of the display screen on the cellular phone 108 and is preferably powered independently.

In the illustrated embodiment, a mobile terminal signal conversion module (MTSCM) 112 resides within a separate housing 110, outside the cellular phone 108.

The functionality of the MTSCM 112 is now further described with concurrent reference to FIG. 1 and the flow diagram of FIG. 4.

The MTSCM 112 processes signals to accommodate reproduction by an external device. Specifically, a multimedia signal is transmitted to the cellular phone 108 through the wireless communications network as previously described (step 402). The multimedia signal may include a video signal intended for reproduction by the cellular phone 108, using the cellular phone display screen. For ease of description, pro-

4

cessing of a video signal is described, although it should be understood that any multimedia signal or component thereof may be converted in accordance with the present invention.

The cellular phone 108 is connected to the MTSCM 110. This may be accommodated by a cable connection that interfaces the cellular phone 108 to the MTSCM 112 housing 110. Through this connection, the MTSCM 112 receives the video signal from the cellular phone 108 (step 404). The video signal as received may be configured to accommodate a video display on the screen provided by the cellular phone 108. The cable connection is an example of a wired connection interfacing the cellular phone 108 to the MTSCM 112. An alternative wired connection is a seat that directly interfaces the two without a cable. A wireless connection may also be provided, although it may currently be less practical to provide than the wired connection because of the potential for high throughput rate requirements. The wireless connection may also implement any conventional known technology including but not limited to a Bluetooth connection.

The MTSCM 112 processes the video signal to provide a converted video signal that has a display format and/or signal power level appropriate for an external display terminal 114 that is separate from the cellular phone 108 (step 406). The display format and/or signal power level of the external display terminal 114 may be different from that of the cellular phone 108 but there may also be embodiments where the format is the same. Even if the formats are the same, conversion of the signals to accommodate display on the external display terminal 114 would still be implemented to adjust the power level for driving the external display, and possibly to minimize throughput requirements. This signal conversion is described further with reference to FIGS. 2 and 3, below.

Still referring to FIGS. 1 and 4, following signal conversion, the MTSCM 112 provides the converted video signal to the external display terminal 114 to accommodate the corresponding video display on a screen provided by the external display terminal 114 (step 408). This may be accommodated through a connection between the MTSCM 112 housing 110 and the external display terminal 114 as shown.

As used herein, mobile terminal refers to typically handheld mobile devices such as cellular phones and personal digital assistants. Although these devices include an execution platform as well as input and display capabilities, such devices are distinguished from personal computers, such as desktop or laptop computers, which are not designed for convenient handheld usage.

FIG. 2 is a block diagram illustrating an example of an MTSCM 200 in accordance with the present invention. The MTSCM 200 may be provided as software, firmware, hardware, or any combination thereof.

Where the MTSCM 200 is provided as software, it operates in the context of an execution platform. That is, the MTSCM 200 includes instructions that are stored in memory for execution by a processor. Any conventional or to-be-developed execution platform may be used. The processor, memory, and related elements such as a power supply are well known and need not be described herein to convey an understanding of the invention. Additionally, FIG. 2 illustrates one modular breakdown for the components of the MTSCM 200. It should be understood that the described functionality may alternatively be provided by an MTSCM having fewer, greater, or differently named modules from those illustrated in the figure.

Additionally, although modules as shown to reside in a common location, it is noted that the functionality may reside in separate components of a system that includes a mobile terminal, an external monitor, and (optionally) an intermedi-

US 8,145,268 B1

5

ate device housing the MTSCM and interfacing the mobile terminal and external monitor. In other words, the overall functionality of the MTSCM may be separated such that portions of the overall functionality are respectively provided by the mobile terminal, separate intermediate housing, and/or the external display device.

The MTSCM 200 may also be provided in the form of a chipset, configured for inclusion in a mobile terminal, dedicated separate signal conversion device, or external display terminal, and to provide the described mobile terminal signal conversion functionality.

The MTSCM 200 includes a mobile terminal interface module 202, a signal conversion module 204, and an external device interface module 206.

The mobile terminal interface module 202 accommodates receiving the multimedia signal from the mobile terminal. A conventional physical interface provides a connection between the MTSCM 200 and the mobile terminal through which the signals flow to the MTSCM 200. The mobile terminal interface module 202 recognizes the multimedia signal and stores the signal for processing by the remaining modules. Buffering and the like may be implemented to accommodate storage and signal processing, as described further below.

The signal conversion module 204 is in communication with the mobile terminal interface module 202 and thus accesses the received multimedia signal. The signal conversion module 204 recognizes the multimedia signal format, and processes the multimedia signal to provide a converted signal. The converted signal may have a format and a signal power level that differs from the one used by the mobile terminal, as appropriate for one or more types of external devices to which the MTSCM 200 is connected. Various examples of the type of devices to which the MTSCM 200 may be connected are illustrated and described in connection with FIG. 3, below.

The external device interface 206 is in communication with the signal conversion module 204 and thus accesses the converted signal. The external device interface 206 also allows connection to the external (e.g., display) device. The external device interface 206 may provide both the feeding of the converted signal to the external device, and driving the external device. Alternatively, the external device interface 206 may merely feed the converted signal to the external device, with the external device including internal elements for driving its signal reproduction (e.g., display) facilities.

FIG. 3 is a block diagram illustrating another example of the MTSCM 300. The MTSCM 300 includes additional detail regarding the signal conversion aspect, and illustrates examples of differing types of external devices to which the MTSCM 300 may provide converted signals. The illustration and corresponding description are provided by way of example. Although numerous connections are illustrated, it should be understood that the present invention may be practiced in the context of providing as few as one, and as many as all of the listed connections. It should also be understood that there may be additional examples that are not listed herein, but which are encompassed by the teachings described herein.

The MTSCM 300 includes an interface/buffer module 302 that is analogous to the previously described mobile terminal interface module. The buffer and interfacing are configured to accommodate signal processing by the remaining elements in support of the requirements and expectations of users of the multimedia signal output (e.g., adequate buffering and processing rate to provide real time audio/video). The mobile terminal video compression format may of course vary, but

6

currently the most likely format is MPEG-1 or MPEG-2. Buffering and throughput rate may also be provided as desired by the designer. Currently, it is believed that 200 Mb is an adequate buffer size, although buffers of 500 Mb or more may of course be provided. Additionally, a throughput rate of approximately 10 Gb/s will be adequate for many current systems, but may be increased as demands and technology evolve.

The Video Compress Decoder 304a receives the multimedia signal. The multimedia signal is typically provided in a compressed format to accommodate increased signal transfer rates. An example of a compression scheme is that provided by one of the MPEG standards (e.g., MPEG-1, MPEG-2, MPEG-4). The Video Compress Decoder 304a is configured to include the appropriate compression/decompression (CODEC) module to accommodate decompression of the received multimedia signal. For example, where the compression scheme is MPEG, the Video Compress Decoder 304a includes an MPEG CODEC to accommodate processing of such multimedia signals.

As an alternative to provision of the Video Compress Decoder 304a in the MTSCM 300, the functionality may be provided within the cellular phone or other mobile terminal. However, this may be less practical because of the high bandwidth that would be required between the cellular phone and the MTSCM 300 to deliver the decompressed signal, and the corresponding likelihood of a larger buffer requirement for the MTSCM 300.

The Video Compress Decoder 304a outputs a decompressed digital multimedia signal that is passed to the Digital/Analog Video Encoder (DAVE) 304b and/or the Digital/Digital Video Encoder (DDVE) 304c. The DAVE 304b is configured to prepare signals for analog external display terminals 320, and the DDVE 304c is configured to prepare signals for digital external display terminals 322. The DAVE 304b and DDVE 304c respectively receive the decompressed multimedia signal and convert the signals to the format(s) and signal power level(s) required for the terminals to which they interface.

Examples of formats used by analog display terminals 320 include S-video, RGBHV, RGBS, and ELA770.3 as illustrated. Similarly, the DDVE 304c provides output using standards such as DVI, DVI-D, HDMI, and IEEE1394. The signals respectively provided by the DAVE 304b and DDVE 304c are provided to the terminals through conventional interfaces 306a-b. The DAVE 304b functionality may be embodied as a video card that is configured accordingly. Examples of video cards that may be configured to provide the described functionality include but are not limited to the Diamond Stealth S60, ASUS V9400-X, or RADEON 7000.

Ultimately, the signals are used to provide a display on the external display, as required according to the particular type of display. For example, the video data stream may be a digital RGB signal which represents the intensity of the red, green and blue light respectively at different position. This signal is converted to analog by a D/A converter. This converted analog signal is quantified to the voltage and format required by the standard, such as the input of cathode-ray-tube (CRT) monitor. This standard video signal will drive a set of electron guns, which produce a controlled stream of electrons to display of red, green and blue light respectively on a CRT screen. This is but one example and the present invention is not limited to a particular technology (e.g., CRT) for the external display.

As described, in one embodiment the MTSCM may be independently housed separately from both the mobile terminal and external display terminal, with respective connections

US 8,145,268 B1

7

to the other devices to provide a system configuration that includes the three pieces of hardware (mobile terminal, conversion box, external display terminal). This configuration provides the flexibility of allowing any standard mobile terminal and/or display to be potentially interface with the MTSCM without imposing constraints on the mobile terminal or external display terminal manufacturers. A possible drawback to this configuration is that additional hardware is introduced into the system.

In lieu of the three component system, the MTSCM may be located in either the mobile terminal or the external display. FIG. 5 is a schematic diagram illustrating an example of a system 500 in which the MTSCM mobile terminal signal conversion may reside within the mobile terminal 508. The components and functionality of the service providers 502a,b network 504 and base station 506 for delivering multimedia signals to the mobile terminal 508 is the same as for the analogous elements of FIG. 1 and need not be re-described. Similarly, the external display terminal 514 may be any of the various types named above.

The MTSCM 512 provides the same functionality described above. However, in contrast to residence in a separate housing, the MTSCM 512 is a component of the mobile terminal 508. A potential advantage of this system 500 is that, again, any standard equipment can serve as an external display terminal 514, without a constraint on the display manufacturer. Additionally, only a simple wired or wireless interface is required to connect the external display with the mobile terminal 508. This means, for example, that the user will not be required to carry a bulky conversion module in addition to their cellular phone.

A potential drawback to this system 500 is that the execution platform of the mobile terminal 508 may be designed to accommodate only traditional functionality, so for some systems it may be challenging to add the MTSCM functionality to the existing platform. Additionally, the MTSCM will consume power that may unduly exhaust the limited power supply offered by the mobile terminal 508 battery. It is useful for this embodiment to provide power to the mobile terminal 508 through the cable connection to the external display terminal 514, but again this may require modification to the mobile terminal 508 as the existing charger interface may be insufficient.

FIG. 6 is a schematic diagram illustrating another example of a system 600, in which the MTSCM 612 resides within the external display terminal 614. As with FIG. 5, the components and functionality of the service providers 602a,b network 604 and base station 606 for delivering multimedia signals to the mobile terminal 608 is the same as for the analogous elements of FIG. 1 and need not be re-described.

Here, the mobile terminal 608 need only be connected directly to the external display terminal 614. However, in lieu of having the MTSCM 612 functionality reside within the mobile terminal 608, it is part of the external display terminal 614. The power supply and execution platform issues associated with placing the MTSCM 614 in the mobile terminal are resolved with this system 600, and any mobile terminal 608 can potentially be connected to any MTSCM-ready external display without requiring modification, other than provision of an output interface. A potential drawback of this configuration is that it adds a component to the standard external display terminal, and corresponding costs.

FIG. 7 is a schematic diagram illustrating examples of mobile terminal signal conversion applications 700 in accordance with the present invention. These applications 700 are provided by way of example, to give the reader an understanding of the potential contexts in which embodiments of the

8

present invention may operate. The present invention is not limited to the disclosed applications, nor are all potential applications required for any given embodiment.

The basic architecture for provision of the wireless communications signal and corresponding multimedia signal is as described above for the service providers 702a-b, network 704, base station 706 and mobile terminal 708. The MTSCM 710 may be separate or reside in the mobile terminal 708 or display terminal 712. Examples of applications 714 where a larger screen and potentially superior audio may be enjoyed include video conference, HDTV, games, GPS, and video on demand. Additionally, embodiments of the present invention will accommodate enjoyment of full multimedia capability in locations 716 including vehicles, airports, hotels and remote resorts. Thus, for example, the present invention accommodates usage inside a vehicle, a plane or any type of transportation, enabling the passenger to browse the Internet, watch TV, play games, participate in a video conference or call, and work on all sorts of software with full functionality.

Thus embodiments of the present invention produce and provide mobile terminal signal conversion. Although the present invention has been described in considerable detail with reference to certain embodiments thereof, the invention may be variously embodied without departing from the spirit or scope of the invention. Therefore, the following claims should not be limited to the description of the embodiments contained herein in any way.

The invention claimed is:

1. A method for processing signals to accommodate reproduction by an alternative display terminal, the method comprising:

receiving, by a conversion device, a video signal appropriate for displaying a video content on a mobile terminal, the video signal being sent from a wireless network communication;

processing, by the conversion device, the video signal to produce a converted video signal for use by the alternative display terminal, wherein processing by the conversion device includes converting a signal format appropriate for the mobile terminal to a display format for the alternative display terminal that is different from the signal format, the display format being a high definition digital format, such that the converted video signal produced by the conversion device comprises the high definition digital format for output to the alternative display terminal; and

providing the converted video signal from the conversion device to the alternative display terminal to accommodate displaying the video content by the alternative display terminal.

2. The method of claim 1, wherein the mobile terminal is a cellular phone.

3. The method of claim 1, wherein the mobile terminal is a personal digital assistant.

4. The method of claim 1, wherein receiving the video signal, processing the video signal to produce the converted video signal, and providing the converted video signal to the alternative display terminal are performed using power from a source that differs from the internal power supply of the mobile terminal.

5. The method of claim 1, wherein the conversion device resides in a housing of the alternative display terminal.

6. The method of claim 1, wherein the video signal received by the conversion device is part of a multimedia signal that is originally received by the mobile terminal in a cellular network communication before it is received by the conversion device from the mobile terminal.

US 8,145,268 B1

9

7. The method of claim 1, wherein the wireless network communication includes a cellular network communication.

8. The method of claim 1, wherein providing the high definition format of the converted video signal from the conversion module to the alternative display terminal is through a high definition multimedia interface (HDMI).

9. The method of claim 1, wherein the conversion device resides in the mobile terminal.

10. The method of claim 1, wherein the conversion device includes the mobile terminal and an intermediary between the mobile terminal and the alternative display terminal.

11. A non-transitory computer readable medium storing program code for operating a conversion device, the program code being executable to perform operations comprising:

receiving, by the conversion device, a video signal appropriate for displaying a video content on a mobile terminal, the video signal being sent from a wireless network communication;

processing, by the conversion device, the video signal to produce a converted video signal for use by the alternative display terminal, wherein processing by the conversion device includes converting a signal format appropriate for the mobile terminal to a display format for the alternative display terminal that is different from the signal format, the display format being a high definition digital format, such that the converted video signal produced by the conversion device comprises the high definition digital format for output to the alternative display terminal; and

providing the converted video signal from the conversion device to the alternative display terminal to accommodate displaying the video content by the alternative display terminal.

12. The computer readable medium of claim 11, wherein the mobile terminal is a cellular phone.

13. The computer readable medium of claim 11, wherein the mobile terminal is a personal digital assistant.

14. The computer readable medium of claim 11, wherein receiving the video signal, processing the video signal to produce the converted video signal, and providing the converted video signal to the alternative display terminal are performed using power from a source that differs from the internal power supply of the mobile terminal.

15. The computer readable medium of claim 11, wherein the conversion device resides in a housing of the alternative display terminal.

16. The computer readable medium of claim 11, wherein the video signal received by the conversion device is part of a multimedia signal that is originally received by the mobile terminal in a cellular network communication before it is received by the conversion device from the mobile terminal.

17. The computer readable medium of claim 11, wherein the wireless network communication includes a cellular network communication.

18. The computer readable medium of claim 11, wherein the high definition format of the converted video signal is a high definition multimedia interface (HDMI) format, and

10

providing the converted video signal from the conversion device to the alternative display terminal is through an HDMI interface.

19. The computer readable medium of claim 11, wherein the conversion device resides in the mobile terminal.

20. The computer readable medium of claim 11, wherein the conversion device includes the mobile terminal and an intermediary between the mobile terminal and the alternative display terminal.

21. An apparatus for converting video signals, the apparatus comprising:

an input interface for receiving a video signal appropriate for displaying a video content on a mobile terminal, the video signal being sent from a wireless network communication;

a processing unit for processing the video signal to produce a converted video signal for use by the alternative display terminal, wherein the processing includes converting a signal format appropriate for the mobile terminal to a display format for the alternative display terminal that is different from the signal format, the display format being a high definition digital format, such that the converted video signal produced by the processing unit comprises the high definition digital format for output to the alternative display terminal; and

an output interface for providing the converted video signal to the alternative display terminal to accommodate displaying the video content by the alternative display terminal.

22. The apparatus of claim 21, wherein the mobile terminal is a cellular phone.

23. The apparatus of claim 21, wherein the mobile terminal is a personal digital assistant.

24. The apparatus of claim 21, further comprising means for providing power to provide power for receiving the video signal, processing the video to produce the converted video signal, and providing the converted video signal to the alternative display terminal.

25. The apparatus of claim 21, wherein the video signal received by the processing unit is part of a multimedia signal that is originally received by the mobile terminal in a cellular network communication before it is received by the processing unit from the mobile terminal.

26. The apparatus of claim 21, wherein the wireless network communication includes a cellular network communication.

27. The apparatus of claim 21, wherein providing the converted video signal from the processing unit to the alternative display terminal is through high definition multimedia interface (HDMI).

28. The apparatus of claim 21, wherein the processing unit resides in the mobile terminal.

29. The apparatus of claim 21, wherein the apparatus comprises multiple hardware components for carrying out said processing of the video signal.

* * * * *

EXHIBIT 4

US 8,224,381 B1

Page 2

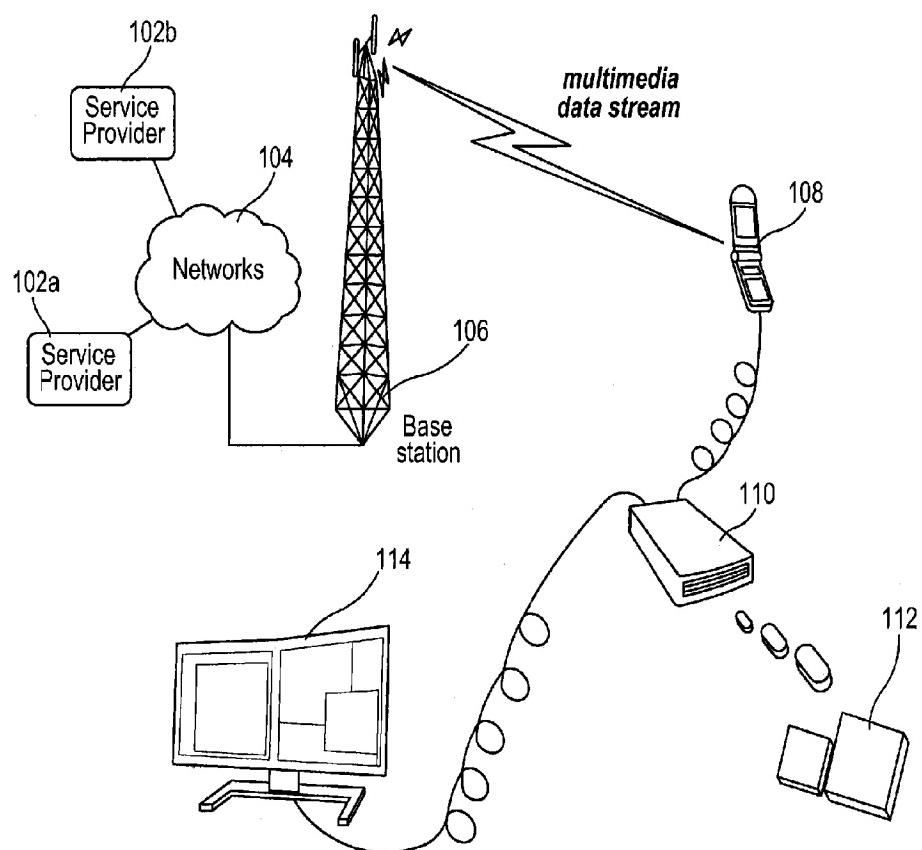
U.S. PATENT DOCUMENTS

6,718,182	B1	4/2004	Kung	2002/0102998	A1	8/2002	Lin
6,781,635	B1	8/2004	Takeda	2002/0137505	A1	9/2002	Eiche et al.
6,795,715	B1	9/2004	Kubo	2002/0137551	A1	9/2002	Toba
6,859,358	B2	2/2005	Baldwin et al.	2003/0054794	A1	3/2003	Zhang
6,871,243	B2	3/2005	Iwase	2003/0104806	A1	6/2003	Ruef et al.
6,873,853	B2	3/2005	Kim	2003/0130009	A1	7/2003	Kung
6,907,276	B2	6/2005	Toba	2004/0046783	A1	3/2004	Montebovi
6,970,127	B2	11/2005	Rakib	2004/0056985	A1	3/2004	Scong
7,202,885	B2	4/2007	Motohashi	2004/0125136	A1	7/2004	Wallenius
7,239,323	B2	7/2007	Park	2004/0157642	A1	8/2004	Lee et al.
7,248,888	B2	7/2007	Inselberg	2004/0177376	A1	9/2004	Caspi et al.
7,257,202	B2	8/2007	Umemura et al.	2004/0212731	A1	10/2004	Sie et al.
7,312,813	B1	12/2007	Heinonen	2005/0036509	A1	2/2005	Acharya et al.
7,360,085	B2	4/2008	Loveria, III	2005/0085183	A1	4/2005	Lee
7,480,484	B2	1/2009	Nam	2005/0088463	A1	4/2005	Schilling
2002/0090980	A1	7/2002	Wilcox et al.	2005/0144641	A1	6/2005	Lewis
2002/0094826	A1	7/2002	Lee	2006/0001737	A1	1/2006	Dawson et al.
				2007/0287498	A1	12/2007	Wang et al.

U.S. Patent

Jul. 17, 2012

Sheet 1 of 7

US 8,224,381 B1**FIG. 1**

U.S. Patent

Jul. 17, 2012

Sheet 2 of 7

US 8,224,381 B1

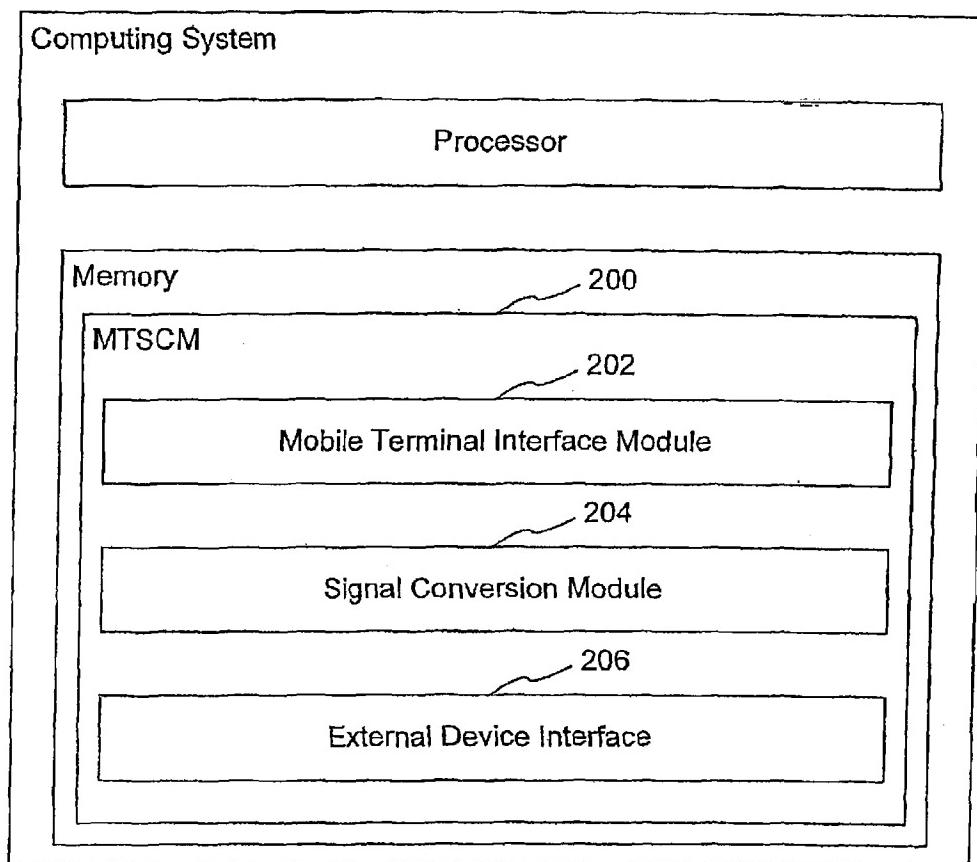


FIG. 2

U.S. Patent

Jul. 17, 2012

Sheet 3 of 7

US 8,224,381 B1

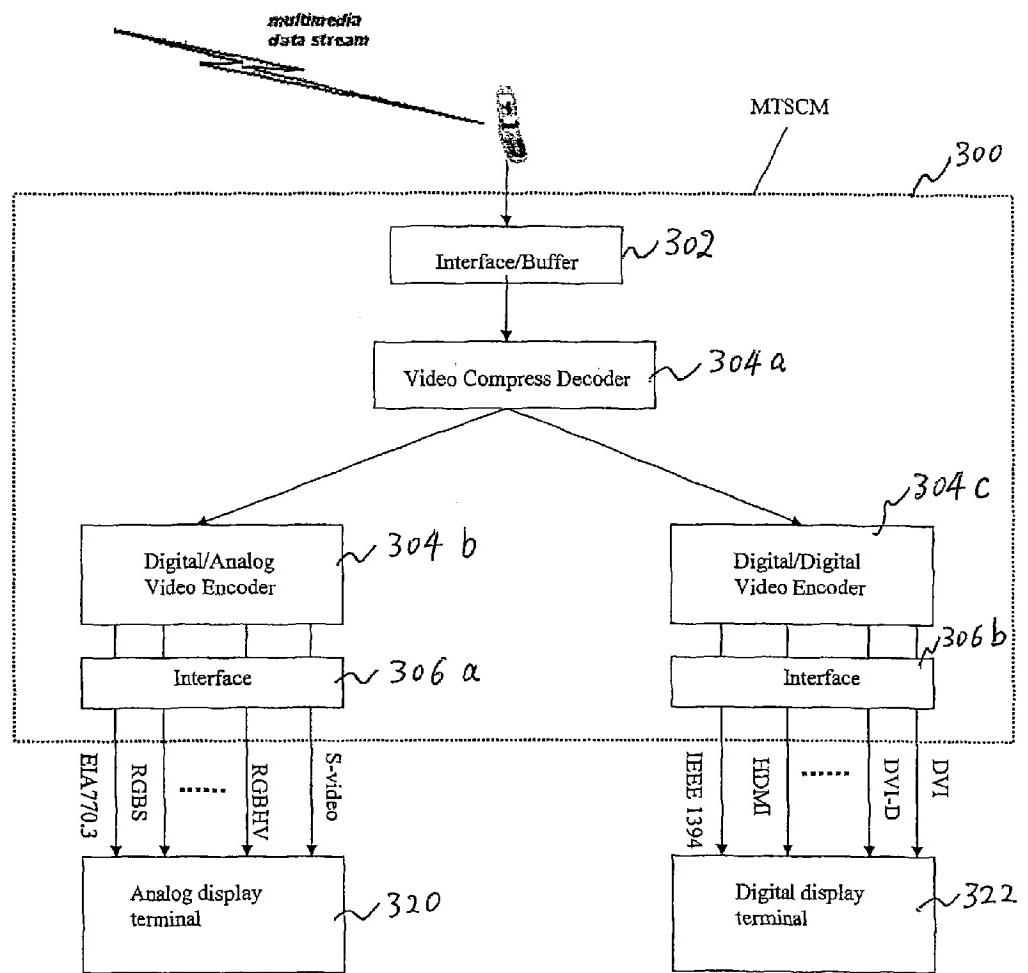


FIG. 3

U.S. Patent

Jul. 17, 2012

Sheet 4 of 7

US 8,224,381 B1

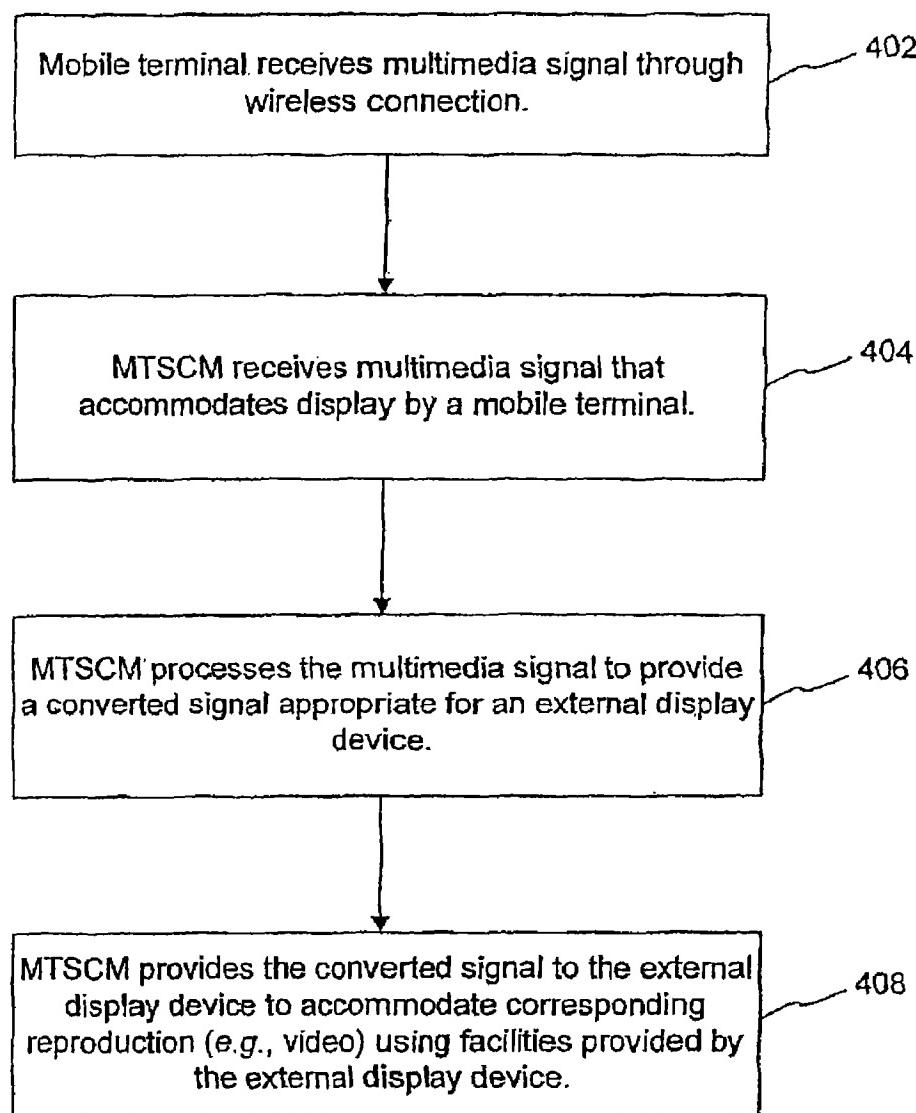


FIG. 4

U.S. Patent

Jul. 17, 2012

Sheet 5 of 7

US 8,224,381 B1

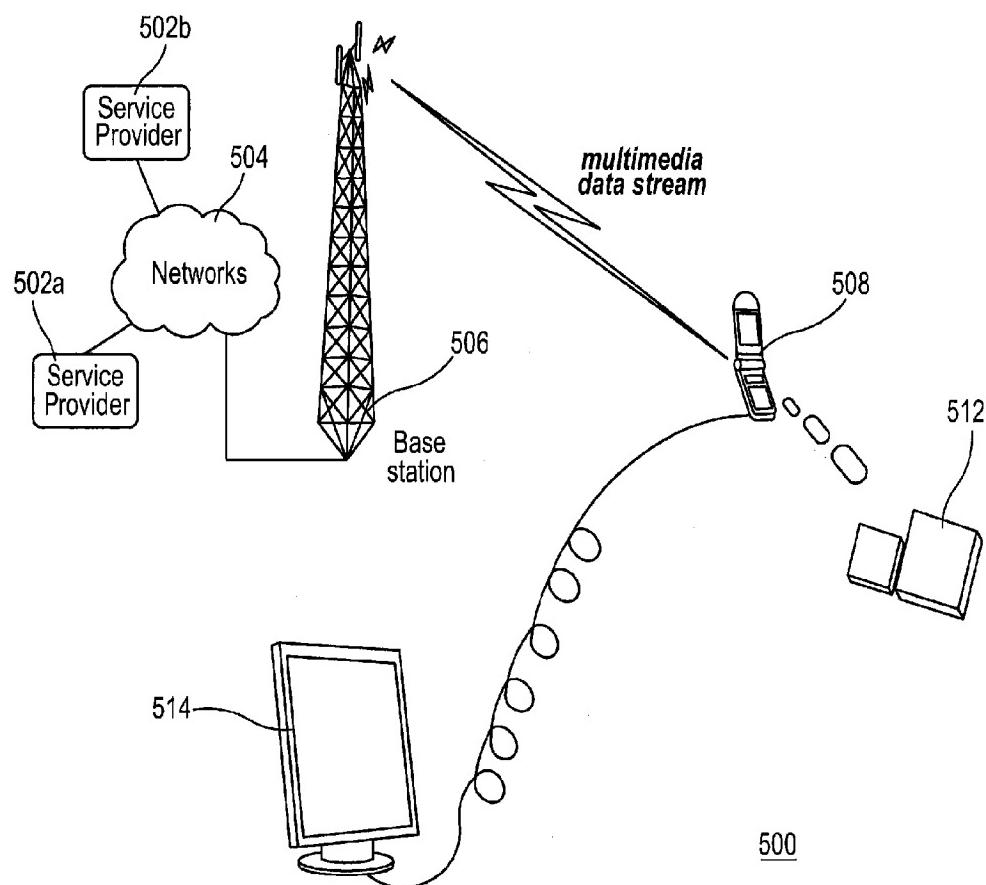


FIG. 5

U.S. Patent

Jul. 17, 2012

Sheet 6 of 7

US 8,224,381 B1

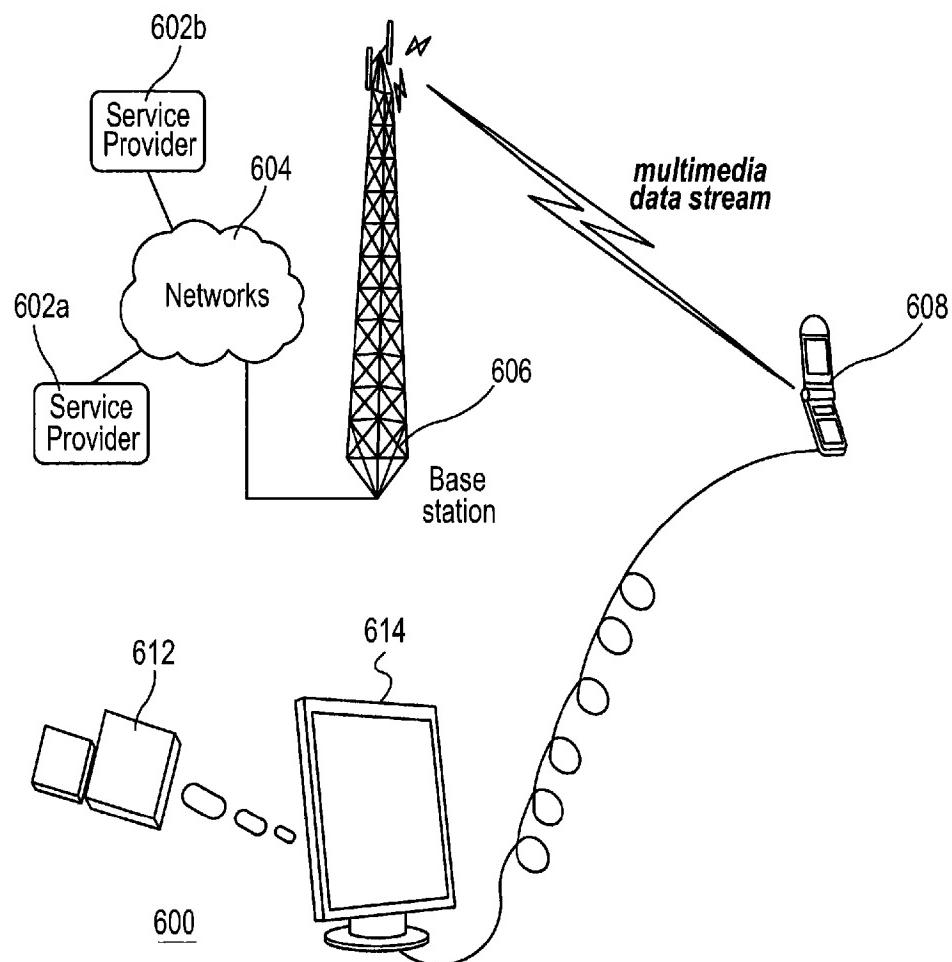


FIG. 6

U.S. Patent

Jul. 17, 2012

Sheet 7 of 7

US 8,224,381 B1

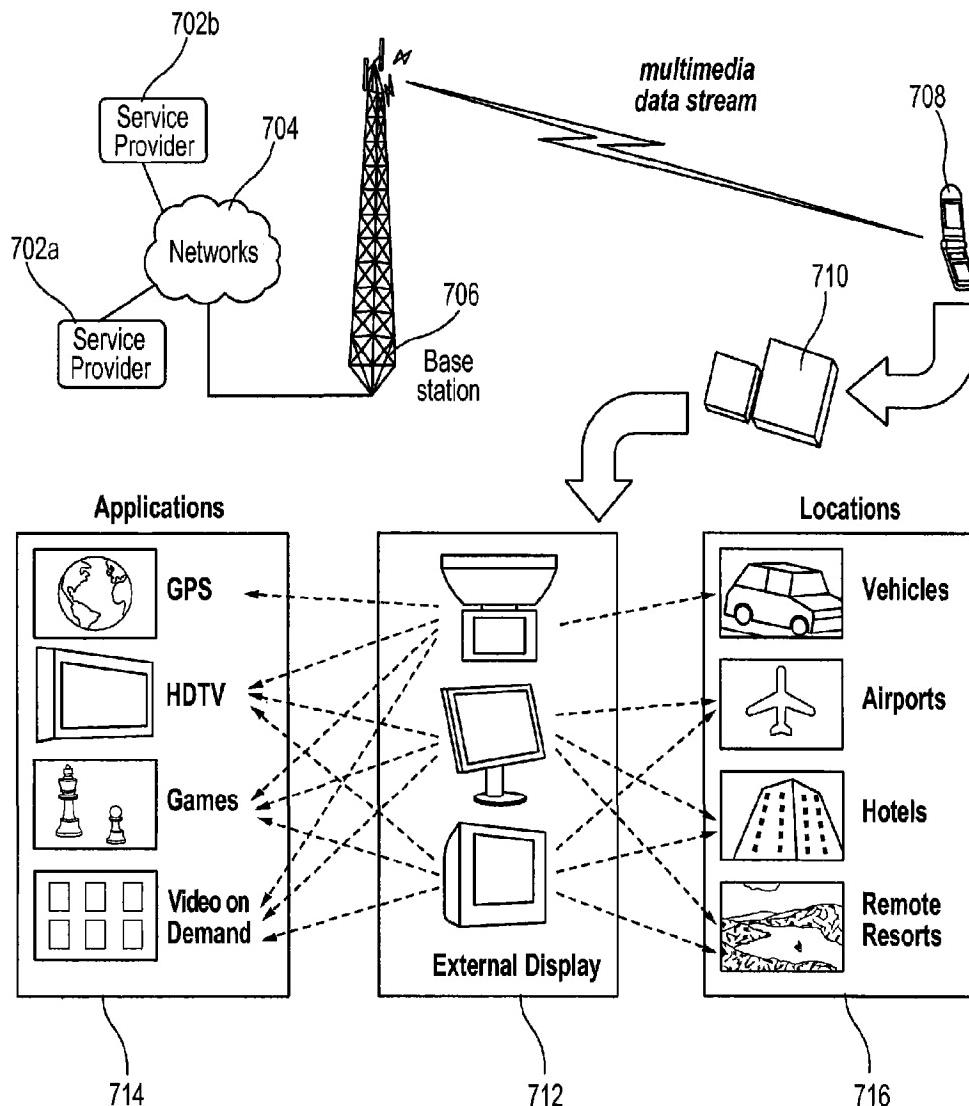


FIG. 7

US 8,224,381 B1

1

METHODS, SYSTEMS AND APPARATUS FOR DISPLAYING THE MULTIMEDIA INFORMATION FROM WIRELESS COMMUNICATION NETWORKS

CROSS REFERENCE TO RELATED APPLICATIONS

This application is a continuation of U.S. application Ser. No. 13/268,001, filed on Oct. 7, 2011, which is a continuation of U.S. application Ser. No. 12/929,408, filed on Jan. 21, 2011, which is a continuation of U.S. application Ser. No. 11/165,341, filed on Jun. 24, 2005, now U.S. Pat. No. 7,899,492, issued Mar. 1, 2011, which claims the benefit of provisional application Ser. No. 60/588,358, filed on Jul. 16, 2004 and entitled "A Method and System for Displaying the Multimedia Information from Wireless Communications or Portable IT Devices." The entire contents of these applications are hereby incorporated by reference.

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates generally to mobile terminals and related technology and more particularly to mobile terminal signal conversion for external display.

2. Description of the Related Art

Handheld mobile terminals (e.g., cellular phones, personal digital assistants (PDA)) continue to evolve both in terms of execution platform and functionality. It is believed that the much of the functionality provided by a personal computer (e.g., desktop or laptop) will ultimately become virtually available in handheld mobile terminals, which will allow users to work with and access multimedia information any time and anywhere.

For example, one particularly appealing advantage of the next generation wireless communication system and beyond (i.e., 3G, 4G, etc.) is the capacity to support high rate multimedia data services as well as conventional voice services. In a conventional cellular system a mobile terminal communicates with a base station wirelessly. Multimedia information including but not limited to television, 3D images, network games, and video phone calls is transmitted from various service providers and received for display on the screen of a mobile terminal. The net result of such a system is rich multimedia information being destined for display on the small screens typical of cellular phones (or the like).

In these and similar systems, the mobile terminal functions as a multimedia terminal to display multimedia information (including high-resolution graphics and high-quality real-time audio/video) sent from high data rate wireless communications network. The limited size (e.g., 2x3") and capability of the mobile terminal screen may render enjoyment of the high rate data flow applications inconvenient, and in some instances useless. One consequence of this inadequacy is likely shrinkage of the potential market size for handheld mobile terminals. Indeed, some have suggested that development of high data rate systems such as 3G systems may be pointless given the limitations imposed by the small screen.

Some mobile units appear to provide a remote control function to an external display system. However, these do not appear to solve the small screen problem outlined above. That is, they do not accommodate display on a larger, external display of video and other multimedia information originally destined for the mobile terminal display screen.

For example, one such interface accommodates usage of the mobile terminal as a remote control for a television, by

2

feeding programming guide information to the mobile terminal. This is useful for allowing the programming guide to be viewed locally while the larger screen displays a current program, but does not address the above-described small screen problem.⁵

Although mobile terminals have been developed to include enhanced signal processing and related capabilities, user enjoyment is diminished by the limitations of the display provided with such mobile terminals. What is needed is a solution to the problem of diminished user enjoyment of mobile terminals because of display limitations.

SUMMARY OF THE INVENTION

- 15 In accordance with the present invention, the multimedia signal destined for the mobile terminal is converted and provided to an external display system, so that the corresponding video and/or audio may be reproduced using the external system.

20 It is believed that this feature will be useful in various environments, including but not limited to transportation environments such as planes, trains and automobiles; hotels; waiting areas; and any location where high data rate services can be more fully supported by external display terminals.

25 According to one aspect, processing signals for reproduction by an external display terminal includes receiving a video signal that accommodates a video display on a first screen provided by the mobile terminal. The video signal is then processed to provide a converted video signal appropriate for

30 an external display terminal that is separate from the mobile terminal. This converted video signal is then provided for the external display terminal to accommodate the corresponding video display on a screen provided by the external display terminal.

35 The present invention can be embodied in various forms, including business processes, computer implemented methods, computer program products, computer systems and networks, user interfaces, application programming interfaces, and the like.

BRIEF DESCRIPTION OF THE DRAWINGS

These and other more detailed and specific features of the present invention are more fully disclosed in the following specification, reference being had to the accompanying drawings, in which:

FIG. 1 is a schematic diagram illustrating an example of a system in which mobile terminal signal conversion may reside in accordance with the present invention.

50 FIG. 2 is a block diagram illustrating an example of a mobile terminal signal conversion module in accordance with the present invention.

FIG. 3 is a block diagram illustrating another example of a mobile terminal signal conversion module in accordance with the present invention.

FIG. 4 is a flow diagram illustrating an embodiment of a process including mobile terminal signal conversion in accordance with the present invention.

FIG. 5 is a schematic diagram illustrating another example
60 of a system in which mobile terminal signal conversion may
reside in accordance with the present invention.

FIG. 6 is a schematic diagram illustrating still another example of a system in which mobile terminal signal conversion may reside in accordance with the present invention.

US 8,224,381 B1

3

DETAILED DESCRIPTION OF THE INVENTION

In the following description, for purposes of explanation, numerous details are set forth, such as flowcharts and system configurations, in order to provide an understanding of one or more embodiments of the present invention. However, it is and will be apparent to one skilled in the art that these specific details are not required in order to practice the present invention.

FIG. 1 is a schematic diagram illustrating an example of a system 100 in which mobile terminal signal conversion may reside in accordance with the present invention.

Mobile terminal signal conversion accommodates displaying the high rate data flow multimedia information available in a wireless communication environment in an external device. This accommodates true realization and enjoyment of the benefits of the multimedia content.

In one example, the multimedia information is provided to a wireless mobile terminal using so-called next generation cellular technology (i.e., 3G and 4G), which can be employed in transmitting multimedia information (e.g., rich graphics, real-time audio/video). Because of the relatively small screen size and low quality ear phones, for many applications the mobile terminal cannot adequately reproduce the high quality multimedia information that can be communicated using next generation technology with adequate clarity and satisfaction. Mobile terminal signal conversion in accordance with this embodiment of the present invention makes usage of a separate multimedia display terminal including but not limited to a monitor, television set, projector, or LCD display. These displays typically have video and audio reproduction capabilities that are superior to those found on mobile terminals. They also use a power supply that is separate from the mobile terminal.

Still referring to the system 100 illustrated in FIG. 1, multimedia information may be provided by any number of service providers 102a-b and delivered through a network 104 to a base station 106 to ultimately accommodate transmission of the multimedia information, among other things, to a cellular phone 108. This system 100 is provided by way of example, and it should be understood that any conventional or to-be-developed technology for delivering voice and/or data to mobile terminals may be provided. These wireless communication networks include but are not limited to a cellular communications network or a wireless local area network.

Also illustrated is a typical external display system 114. This may also be variously provided and may be digital or analog. Examples of digital systems include HDTV, LCD and plasma. Examples of analog systems include television sets that implement standards such as NTSC, PAL, SECAM, and analog computer monitors (SVGA, VGA). The external display system 114 does not have the size constraints of the display screen on the cellular phone 108 and is preferably powered independently.

In the illustrated embodiment, a mobile terminal signal conversion module (MTSCM) 112 resides within a separate housing 110, outside the cellular phone 108.

The functionality of the MTSCM 112 is now further described with concurrent reference to FIG. 1 and the flow diagram of FIG. 4.

The MTSCM 112 processes signals to accommodate reproduction by an external device. Specifically, a multimedia signal is transmitted to the cellular phone 108 through the wireless communications network as previously described (step 402). The multimedia signal may include a video signal intended for reproduction by the cellular phone 108, using the cellular phone display screen. For ease of description, pro-

cessing of a video signal is described, although it should be understood that any multimedia signal or component thereof may be converted in accordance with the present invention.

The cellular phone **108** is connected to the MTSCM **110**. This may be accommodated by a cable connection that interfaces the cellular phone **108** to the MTSCM **112** housing **110**. Through this connection, the MTSCM **112** receives the video signal from the cellular phone **108** (step **404**). The video signal as received may be configured to accommodate a video display on the screen provided by the cellular phone **108**. The cable connection is an example of a wired connection interfacing the cellular phone **108** to the MTSCM **112**. An alternative wired connection is a seat that directly interfaces the two without a cable. A wireless connection may also be provided, although it may currently be less practical to provide than the wired connection because of the potential for high throughput rate requirements. The wireless connection may also implement any conventional known technology including but not limited to a Bluetooth connection.

20 The MTSCM 112 processes the video signal to provide a converted video signal that has a display format and/or signal power level appropriate for an external display terminal 114 that is separate from the cellular phone 108 (step 406). The display format and/or signal power level of the external display terminal 114 may be different from that of the cellular phone 108 but there may also be embodiments where the format is the same. Even if the formats are the same, conversion of the signals to accommodate display on the external display terminal 114 would still be implemented to adjust the power level for driving the external display, and possibly to minimize throughput requirements. This signal conversion is described further with reference to FIGS. 2 and 3, below.

25

30

Still referring to FIGS. 1 and 4, following signal conversion, the MTSCM 112 provides the converted video signal to the external display terminal 114 to accommodate the corresponding video display on a screen provided by the external display terminal 114 (step 408). This may be accommodated through a connection between the MTSCM 112 housing 110 and the external display terminal 114 as shown.

40 As used herein, mobile terminal refers to typically handheld mobile devices such as cellular phones and personal digital assistants. Although these devices include an execution platform as well as input and display capabilities, such devices are distinguished from personal computers, such as
45 desktop or laptop computers, which are not designed for convenient handheld usage.

FIG. 2 is a block diagram illustrating an example of an MTSCM 200 in accordance with the present invention. The MTSCM 200 may be provided as software, firmware, hardware, or any combination thereof.

Where the MTSCM **200** is provided as software, it operates in the context of an execution platform. That is, the MTSCM **200** includes instructions that are stored in memory for execution by a processor. Any conventional or to-be-developed execution platform may be used. The processor, memory, and related elements such as a power supply are well known and need not be described herein to convey an understanding of the invention. Additionally, FIG. 2 illustrates one modular breakdown for the components of the MTSCM **200**. It should be understood that the described functionality may alternatively be provided by an MTSCM having fewer, greater, or differently named modules from those illustrated in the figure.

Additionally, although modules as shown to reside in a common location, it is noted that the functionality may reside in separate components of a system that includes a mobile terminal, an external monitor, and (optionally) an intermedi-

US 8,224,381 B1

5

ate device housing the MTSCM and interfacing the mobile terminal and external monitor. In other words, the overall functionality of the MTSCM may be separated such that portions of the overall functionality are respectively provided by the mobile terminal, separate intermediate housing, and/or the external display device.

The MTSCM 200 may also be provided in the form of a chipset, configured for inclusion in a mobile terminal, dedicated separate signal conversion device, or external display terminal, and to provide the described mobile terminal signal conversion functionality.

The MTSCEM 200 includes a mobile terminal interface module 202, a signal conversion module 204, and an external device interface module 206.

The mobile terminal interface module **202** accommodates receiving the multimedia signal from the mobile terminal. A conventional physical interface provides a connection between the MTSCM **200** and the mobile terminal through which the signals flow to the MTSCM **200**. The mobile terminal interface module **202** recognizes the multimedia signal and stores the signal for processing by the remaining modules. Buffering and the like may be implemented to accommodate storage and signal processing, as described further below.

The signal conversion module **204** is in communication with the mobile terminal interface module **202** and thus accesses the received multimedia signal. The signal conversion module **204** recognizes the multimedia signal format, and processes the multimedia signal to provide a converted signal. The converted signal may have a format and a signal power level that differs from the one used by the mobile terminal, as appropriate for one or more types of external devices to which the MTSCM **200** is connected. Various examples of the type of devices to which the MTSCM **200** may be connected are illustrated and described in connection with FIG. 3, below.

The external device interface **206** is in communication with the signal conversion module **204** and thus accesses the converted signal. The external device interface **206** also allows connection to the external (e.g., display) device. The external device interface **206** may provide both the feeding of the converted signal to the external device, and driving the external device. Alternatively, the external device interface **206** may merely feed the converted signal to the external device, with the external device including internal elements for driving its signal reproduction (e.g., display) facilities.

FIG. 3 is a block diagram illustrating another example of the MTSCM 300. The MTSCM 300 includes additional detail regarding the signal conversion aspect, and illustrates examples of differing types of external devices to which the MTSCM 300 may provide converted signals. The illustration and corresponding description are provided by way of example. Although numerous connections are illustrated, it should be understood that the present invention may be practiced in the context of providing as few as one, and as many as all of the listed connections. It should also be understood that there may be additional examples that are not listed herein, but which are encompassed by the teachings described herein.

The MTSCM 300 includes an interface/buffer module 302 that is analogous to the previously described mobile terminal interface module. The buffer and interfacing are configured to accommodate signal processing by the remaining elements in support of the requirements and expectations of users of the multimedia signal output (e.g., adequate buffering and processing rate to provide real time audio/video). The mobile terminal video compression format may of course vary, but

6

currently the most likely format is MPEG-1 or MPEG-2. Buffering and throughput rate may also be provided as desired by the designer. Currently, it is believed that 200 Mb is an adequate buffer size, although buffers of 500 Mb or more 5 may of course be provided. Additionally, a throughput rate of approximately 10 Gb/s will be adequate for many current systems, but may be increased as demands and technology evolve.

The Video Compress Decoder 304a receives the multimedia signal. The multimedia signal is typically provided in a compressed format to accommodate increased signal transfer rates. An example of a compression scheme is that provided by one of the MPEG standards (e.g., MPEG-1, MPEG-2, MPEG-4). The Video Compress Decoder 304a is configured to include the appropriate compression/decompression (CODEC) module to accommodate decompression of the received multimedia signal. For example, where the compression scheme is MPEG, the Video Compress Decoder 304a includes an MPEG CODEC to accommodate processing of such multimedia signals.

As an alternative to provision of the Video Compress Decoder 304a in the MTSCM 300, the functionality may be provided within the cellular phone or other mobile terminal. However, this may be less practical because of the high band-
25 width that would be required between the cellular phone and the MTSCM 300 to deliver the decompressed signal, and the corresponding likelihood of a larger buffer requirement for the MTSCM 300.

The Video Compress Decoder **304a** outputs a decompressed digital multimedia signal that is passed to the Digital/Analog Video Encoder (DAVE) **304b** and/or the Digital/Digital Video Encoder (DDVE) **304c**. The DAVE **304b** is configured to prepare signals for analog external display terminals **320**, and the DDVE **304c** is configured to prepare signals for digital external display terminals **322**. The DAVE **304b** and DDVE **304c** respectively receive the decompressed multimedia signal and convert the signals to the format(s) and signal power level(s) required for the terminals to which they interface.

40 Examples of formats used by analog display terminals **320**
include S-video, RGBHV, RGBS, and EIA770.3 as illus-
trated. Similarly, the DDVE **304c** provides output using stan-
dards such as DVI, DVI-D, HDMI, and IEEE1394. The sig-
nals respectively provided by the DAVE **304b** and DDVE
45 **304c** are provided to the terminals through conventional inter-
faces **306a-b**. The DAVE **304b** functionality may be embod-
ied as a video card that is configured accordingly. Examples
of video cards that may be configured to provide the described
functionality include but are not limited to the Diamond
50 Stealth S60, ASUS V9400-X, or RADEON 7000.

Ultimately, the signals are used to provide a display on the external display, as required according to the particular type of display. For example, the video data stream may be a digital RGB signal which represents the intensity of the red, green and blue light respectively at different position. This signal is converted to analog by a D/A converter. This converted analog signal is quantified to the voltage and format required by the standard, such as the input of cathode-ray-tube (CRT) monitor. This standard video signal will drive a set of electron guns, which produce a controlled stream of electrons to display of red, green and blue light respectively on a CRT screen. This is but one example and the present invention is not limited to a particular technology (e.g., CRT) for the external display.

65 As described, in one embodiment the MTSCM may be independently housed separately from both the mobile terminal and external display terminal, with respective connections

US 8,224,381 B1

7

to the other devices to provide a system configuration that includes the three pieces of hardware (mobile terminal, conversion box, external display terminal). This configuration provides the flexibility of allowing any standard mobile terminal and/or display to be potentially interface with the MTSCM without imposing constraints on the mobile terminal or external display terminal manufacturers. A possible drawback to this configuration is that additional hardware is introduced into the system.

In lieu of the three component system, the MTSCM may be located in either the mobile terminal or the external display. FIG. 5 is a schematic diagram illustrates an example of a system 500 in which the MTSCM mobile terminal signal conversion may reside within the mobile terminal 508. The components and functionality of the service providers 502a,b network 504 and base station 506 for delivering multimedia signals to the mobile terminal 508 is the same as for the analogous elements of FIG. 1 and need not be re-described. Similarly, the external display terminal 514 may be any of the various types named above.

The MTSCM 512 provides the same functionality described above. However, in contrast to residence in a separate housing, the MTSCM 512 is a component of the mobile terminal 508. A potential advantage of this system 500 is that, again, any standard equipment can serve as an external display terminal 514, without a constraint on the display manufacturer. Additionally, only a simple wired or wireless interface is required to connect the external display with the mobile terminal 508. This means, for example, that the user will not be required to carry a bulky conversion module in addition to their cellular phone.

A potential drawback to this system **500** is that the execution platform of the mobile terminal **508** may be designed to accommodate only traditional functionality, so for some systems it may be challenging to add the MTSCM functionality to the existing platform. Additionally, the MTSCM will consume power that may unduly exhaust the limited power supply offered by the mobile terminal **508** battery. It is useful for this embodiment to provide power to the mobile terminal **508** through the cable connection to the external display terminal **514**, but again this may require modification to the mobile terminal **508** as the existing charger interface may be insufficient.

FIG. 6 is a schematic diagram illustrating another example of a system 600, in which the MTSCM 612 resides within the external display terminal 614. As with FIG. 5, the components and functionality of the service providers 602a,b network 604 and base station 606 for delivering multimedia signals to the mobile terminal 608 is the same as for the analogous elements of FIG. 1 and need not be re-described.

Here, the mobile terminal **608** need only be connected directly to the external display terminal **614**. However, in lieu of having the MTSCM **612** functionality reside within the mobile terminal **608**, it is part of the external display terminal **614**. The power supply and execution platform issues associated with placing the MTSCM **614** in the mobile terminal are resolved with this system **600**, and any mobile terminal **608** can potentially be connected to any MTSCM-ready external display without requiring modification, other than provision of an output interface. A potential drawback of this configuration is that it adds a component to the standard external display terminal, and corresponding costs.

FIG. 7 is a schematic diagram illustrating examples of mobile terminal signal conversion applications 700 in accordance with the present invention. These applications 700 are provided by way of example, to give the reader an understanding of the potential contexts in which embodiments of the

8

present invention may operate. The present invention is not limited to the disclosed applications, nor are all potential applications required for any given embodiment.

The basic architecture for provision of the wireless communications signal and corresponding multimedia signal is as described above for the service providers 702a-b, network 704, base station 706 and mobile terminal 708. The MTSCLM 710 may be separate or reside in the mobile terminal 708 or display terminal 712. Examples of applications 714 where a larger screen and potentially superior audio may be enjoyed include video conference, HDTV, games, GPS, and video on demand. Additionally, embodiments of the present invention will accommodate enjoyment of full multimedia capability in locations 716 including vehicles, airports, hotels and remote resorts. Thus, for example, the present invention accommodates usage inside a vehicle, a plane or any type of transportation, enabling the passenger to browse the Internet, watch TV, play games, participate in a video conference or call, and work on all sorts of software with full functionality.

20 Thus embodiments of the present invention produce and provide mobile terminal signal conversion. Although the present invention has been described in considerable detail with reference to certain embodiments thereof, the invention may be variously embodied without departing from the spirit 25 or scope of the invention. Therefore, the following claims should not be limited to the description of the embodiments contained herein in any way.

The invention claimed is:

- 30 1. A method for processing signals to accommodate reproduction by an alternative display terminal, the method comprising:
35 receiving, by a conversion device, a video signal appropriate for displaying a video content on a mobile terminal, the video signal being sent from a wireless network communication;
40 processing, by the conversion device, the video signal to produce a converted video signal for use by the alternative display terminal, wherein the processing by the conversion device includes converting a signal format appropriate for the mobile terminal to a different format for output to the alternative display terminal, such that the converted video signal produced by the conversion device comprises a high definition television (HDTV) digital signal for output to the alternative display terminal; and
45 providing the converted video signal from the conversion device to the alternative display terminal through a high definition multimedia interface (HDMI) to accommodate displaying the video content by the alternative display terminal.
50 2. The method of claim 1, wherein the mobile terminal is a cellular phone.
55 3. The method of claim 1, wherein the mobile terminal is a personal digital assistant.
60 4. The method of claim 1, wherein receiving the video signal, processing the video to produce the converted video signal, and providing the converted video signal to the alternative display terminal are performed using power from a source that differs from the internal power supply of the mobile terminal.
65 5. The method of claim 1, wherein the conversion device resides in a housing of the alternative display terminal.
70 6. The method of claim 1, wherein the video signal received by the conversion device is part of a multimedia signal that is originally received by the mobile terminal before it is received by the conversion device from the mobile terminal.

US 8,224,381 B1

9

7. The method of claim 1, wherein the wireless network communication includes a cellular network communication.

8. The method of claim 1, wherein said converting the signal format to the different format comprises encoding the video signal according to HDMI requirements.

9. The method of claim 1, wherein the conversion device resides in the mobile terminal.

10. The method of claim 1, wherein the conversion device includes the mobile terminal and an intermediary between the mobile terminal and the alternative display.

11. The method of claim 1, wherein the mobile terminal receives power through a connection to the alternative display.

12. The method of claim 1, wherein the mobile terminal receives the video signal sent from the wireless network communication, and provides the video signal to a housing through a housing interface, such that said receiving of the video signal is through the housing interface of the housing.

13. The method of claim 1, wherein said processing comprises setting the converted video signal to have a power level required by the alternative display terminal.

14. The method of claim 1, wherein receiving the video signal, processing the video signal to provide the converted video signal, and providing the converted video signal to the alternative display terminal are performed in an intermediate device that is separate from the mobile terminal and the alternative display terminal.

15. The method of claim 14, wherein the intermediate device receives an RF signal that includes the video signal.

16. The method of claim 1, wherein the wireless network communication includes a wireless local area network communication.

17. The method of claim 1, wherein a housing having a housing interface is configured to interface with the mobile terminal, and wherein the housing provides the converted video signal to the alternative display terminal through the HDMI.

18. The method of claim 17, wherein at least a portion of said processing the video signal occurs in the housing.

19. A non-transitory computer readable medium storing program code for operating a conversion device, the program code being executable to perform operations comprising:

receiving, by the conversion device, a video signal appropriate for displaying a video content on a mobile terminal, the video signal being sent from a wireless network communication;

processing, by the conversion device, the video signal to produce a converted video signal for use by an alternative display terminal, wherein the processing by the conversion device includes converting a signal format appropriate for the mobile terminal to a different format for output to the alternative display terminal, such that the converted video signal produced by the conversion device comprises a high definition television (HDTV) digital signal for output to the alternative display terminal; and

providing the converted video signal from the conversion device to the alternative display terminal through a high definition multimedia interface (HDMI) to accommodate displaying the video content by the alternative display terminal.

20. The computer readable medium of claim 19, wherein the mobile terminal is a cellular phone.

21. The computer readable medium of claim 19, wherein the mobile terminal is a personal digital assistant.

22. The computer readable medium of claim 19, wherein receiving the video signal, processing the video to produce

10

the converted video signal, and providing the converted video signal to the alternative display terminal are performed using power from a source that differs from the internal power supply of the mobile terminal.

23. The computer readable medium of claim 19, wherein the conversion device resides in a housing of the alternative display terminal.

24. The computer readable medium of claim 19, wherein the video signal received by the conversion device is part of a multimedia signal that is originally received by the mobile terminal before it is received by the conversion device from the mobile terminal.

25. The computer readable medium of claim 19, wherein the wireless network communication includes a cellular network communication.

26. The computer readable medium of claim 19, wherein said converting the signal format to the different format comprises encoding the video signal according to HDMI requirements.

27. The computer readable medium of claim 19, wherein the conversion device resides in the mobile terminal.

28. The computer readable medium of claim 19, wherein the mobile terminal receives power through a connection to the alternative display.

29. The computer readable medium of claim 19, wherein the mobile terminal receives the video signal sent from the wireless network communication, and provides the video signal to a housing through a housing interface, such that said receiving of the video signal is through the housing interface of the housing.

30. The computer readable medium of claim 19, wherein said processing comprises setting the converted video signal to have a power level required by the alternative display terminal.

31. The computer program product of claim 19, wherein the wireless network communication includes a wireless local area network communication.

32. The computer readable medium of claim 19, wherein a housing having a housing interface is configured to interface with the mobile terminal, and wherein the housing provides the converted video signal to the alternative display terminal through the HDMI.

33. An apparatus for converting video signals, the apparatus comprising:

an input interface for receiving a video signal appropriate for displaying a video content on a mobile terminal, the video signal being sent from a wireless network communication;

a processing unit for processing the video signal to produce a converted video signal for use by an alternative display terminal, wherein the processing includes converting a signal format appropriate for the mobile terminal to a different format for output to the alternative display terminal, such that the converted video signal produced by the processing unit comprises a high definition television (HDTV) digital signal for output to the alternative display terminal; and

an output interface for providing the converted video signal to the alternative display terminal through a high definition multimedia interface (HDMI) to accommodate displaying the video content by the alternative display terminal.

34. The apparatus of claim 33, wherein the mobile terminal is a cellular phone.

35. The apparatus of claim 33, wherein the mobile terminal is a personal digital assistant.

US 8,224,381 B1

11

36. The apparatus of claim **33**, further comprising means for providing power to provide power for receiving the video signal, processing the video to produce the converted video signal, and providing the converted video signal to the alternative display terminal.

37. The apparatus of claim **33**, wherein the video signal received by the processing unit is part of a multimedia signal that is originally received by the mobile terminal before it is received by the processing unit from the mobile terminal.

38. The apparatus of claim **33**, wherein the wireless network communication includes a cellular network communication.

39. The apparatus of claim **33**, wherein said converting the signal format to the different format comprises encoding the video signal according to HDMI requirements.

40. The apparatus of claim **33**, wherein the processing unit resides in the mobile terminal.

41. The apparatus of claim **33**, wherein the mobile terminal receives power through a connection to the alternative display.

42. The apparatus of claim **33**, wherein the mobile terminal receives the video signal sent from the wireless network com-

12

munication, and provides the video signal to a housing through a housing interface, such that said receiving of the video signal is through the housing interface of the housing.

43. The apparatus of claim **33**, wherein said processing comprises setting the converted video signal to have a power level required by the alternative display terminal.

44. The apparatus of claim **33**, wherein the apparatus comprises multiple hardware components for carrying out said processing of the video signal.

45. The apparatus of claim **33**, wherein the wireless network communication includes a wireless local area network communication.

46. The apparatus of claim **33**, wherein a housing having a housing interface is configured to interface with the mobile terminal, and wherein the housing provides the converted video signal to the alternative display terminal through the HDMI.

47. The apparatus of claim **46**, wherein at least a portion of said processing the video signal occurs in the housing.

20

* * * * *

EXHIBIT 6



US008135398B2

(12) United States Patent
Wang et al.(10) Patent No.: US 8,135,398 B2
(45) Date of Patent: *Mar. 13, 2012

(54) METHOD AND APPARATUS FOR MULTIMEDIA COMMUNICATIONS WITH DIFFERENT USER TERMINALS

(75) Inventors: **Tiehong Wang**, Arlington, VA (US); **Ning Wang**, La Jolla, CA (US); **Ximing Wang**, Beijing (CN); **Tiejun Wang**, La Jolla, CA (US); **William E. Halal**, Washington, DC (US)(73) Assignee: **SellerBid, Inc.**, Arlington, VA (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

This patent is subject to a terminal disclaimer.

(21) Appl. No.: 13/067,079

(22) Filed: May 6, 2011

(65) Prior Publication Data

US 2011/0211113 A1 Sep. 1, 2011

Related U.S. Application Data

- (63) Continuation of application No. 11/802,418, filed on May 22, 2007, now Pat. No. 7,957,733, which is a continuation-in-part of application No. 11/501,747, filed on Aug. 10, 2006, now Pat. No. 7,603,131, and a continuation-in-part of application No. 11/165,341, filed on Jun. 24, 2005, now Pat. No. 7,899,492, said application No. 11/802,418 is a continuation-in-part of application No. 11/540,637, filed on Oct. 2, 2006, now Pat. No. 7,647,024.
- (60) Provisional application No. 60/787,510, filed on Mar. 31, 2006, provisional application No. 60/707,561, filed on Aug. 12, 2005, provisional application No. 60/588,358, filed on Jul. 16, 2004, provisional

application No. 60/722,444, filed on Oct. 3, 2005, provisional application No. 60/787,510, filed on Mar. 31, 2006, provisional application No. 60/832,962, filed on Jul. 25, 2006, provisional application No. 60/899,037, filed on Feb. 2, 2007.

- (51) Int. Cl.
H04W 4/00 (2009.01)
- (52) U.S. Cl. 455/426.2; 455/414.1; 455/426.1; 455/416; 725/62; 709/250; 709/249; 709/228
- (58) Field of Classification Search 455/414.1, 455/426.1, 416; 709/250, 249, 228; 725/62
See application file for complete search history.

(56) References Cited

U.S. PATENT DOCUMENTS

6,760,797 B1 *	7/2004	Kim	710/107
7,957,733 B2 *	6/2011	Wang et al.	455/426.2
2002/0075382 A1 *	6/2002	Cohen	348/14.01
2002/0141403 A1 *	10/2002	Akahane et al.	370/389
2002/0144121 A1 *	10/2002	Ellison et al.	713/176
2002/0147978 A1 *	10/2002	Dolgonos et al.	725/62
2003/0153280 A1 *	8/2003	Kopp et al.	455/90
2003/0226143 A1 *	12/2003	Michael et al.	725/32
2004/0158873 A1 *	8/2004	Pasqualino	725/131
2005/0114891 A1 *	5/2005	Wasenius	725/62

* cited by examiner

Primary Examiner — Nick Corsaro

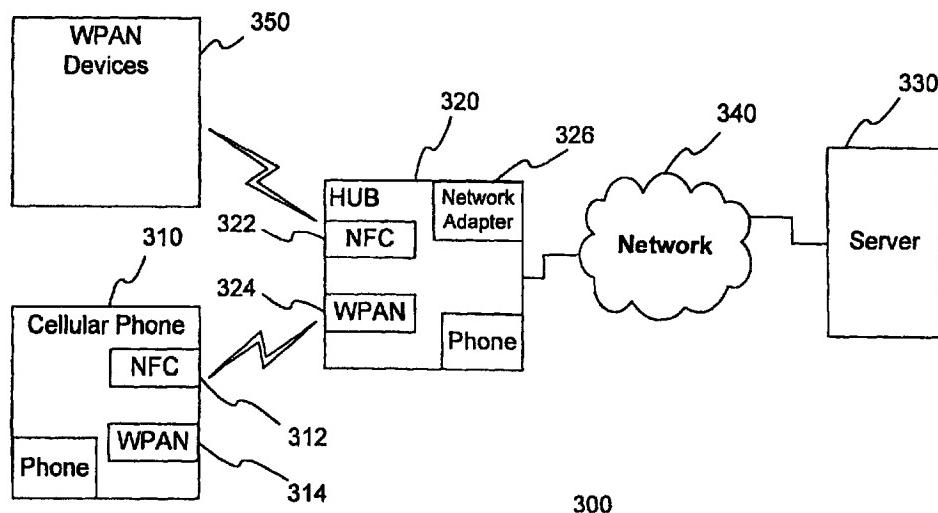
Assistant Examiner — Quan Hua

(74) Attorney, Agent, or Firm — Rader, Fishman & Grauer PLLC

(57) ABSTRACT

Multimedia communications with cross-layer optimization in multimedia communications with different user terminals. Various optimization for the delivery of multimedia content across different channels are provided concurrently to a plurality of user terminals.

93 Claims, 20 Drawing Sheets



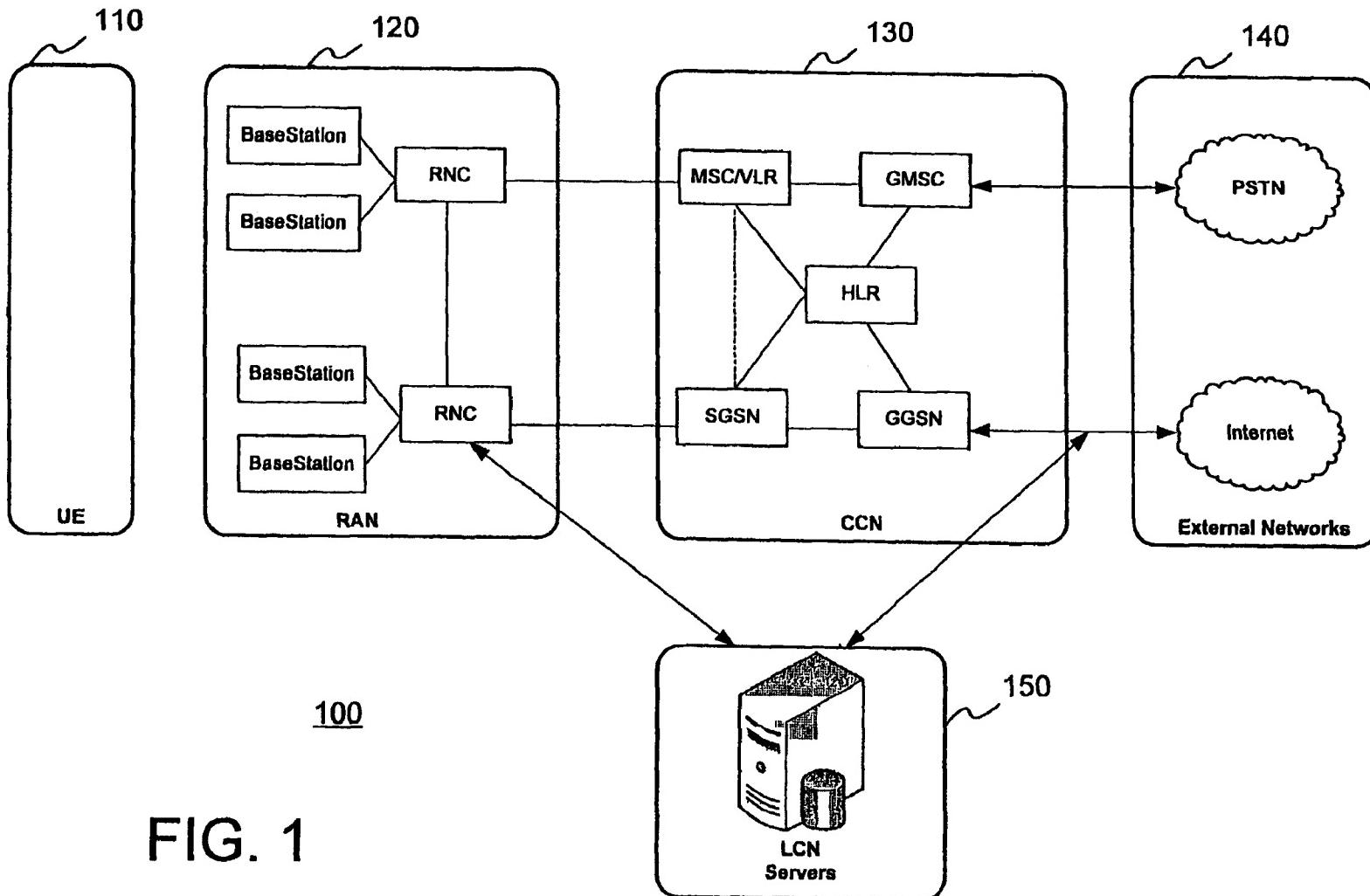


FIG. 1

A00351

U.S. Patent

Mar. 13, 2012

Sheet 2 of 20

US 8,135,398 B2

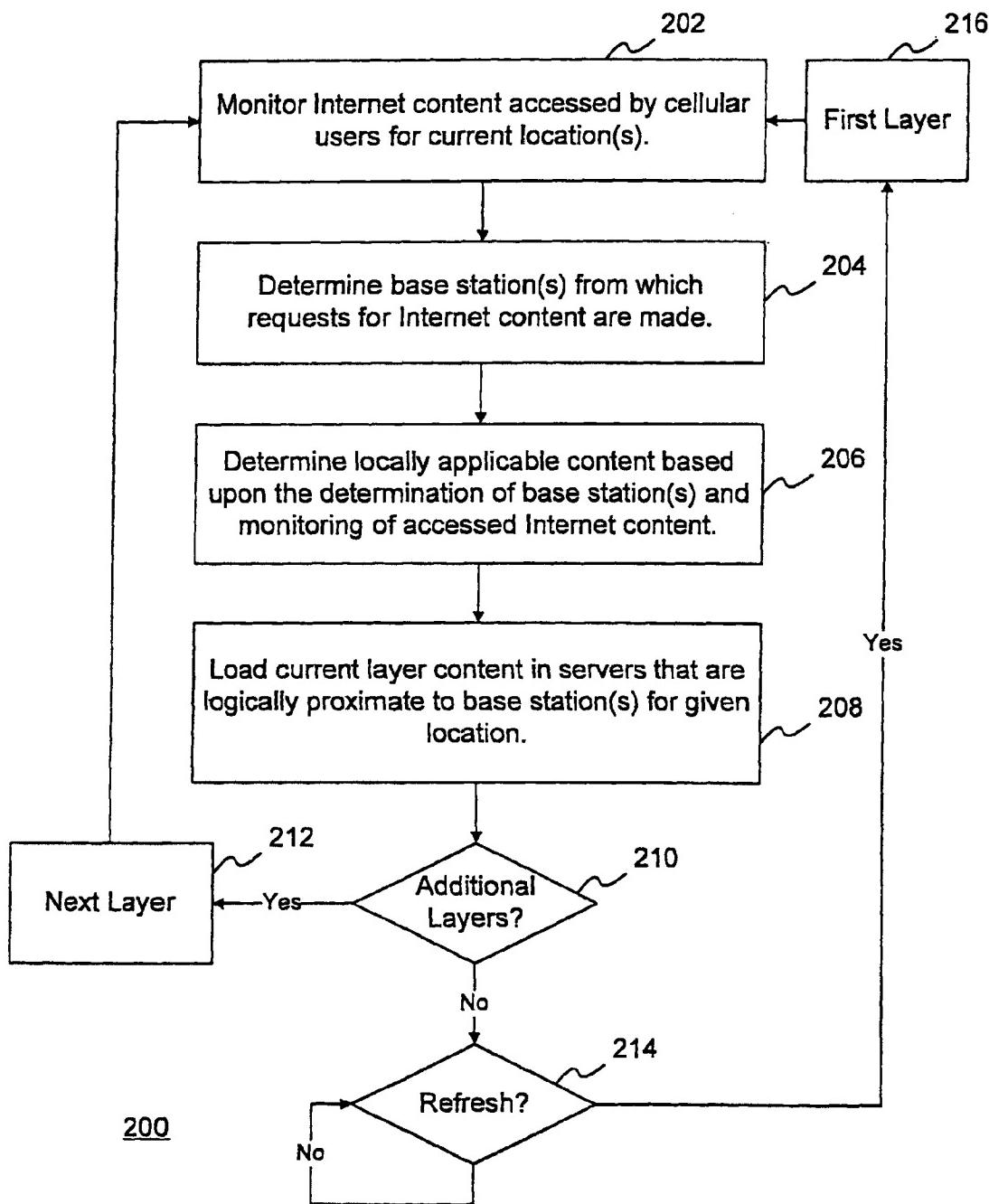


FIG. 2

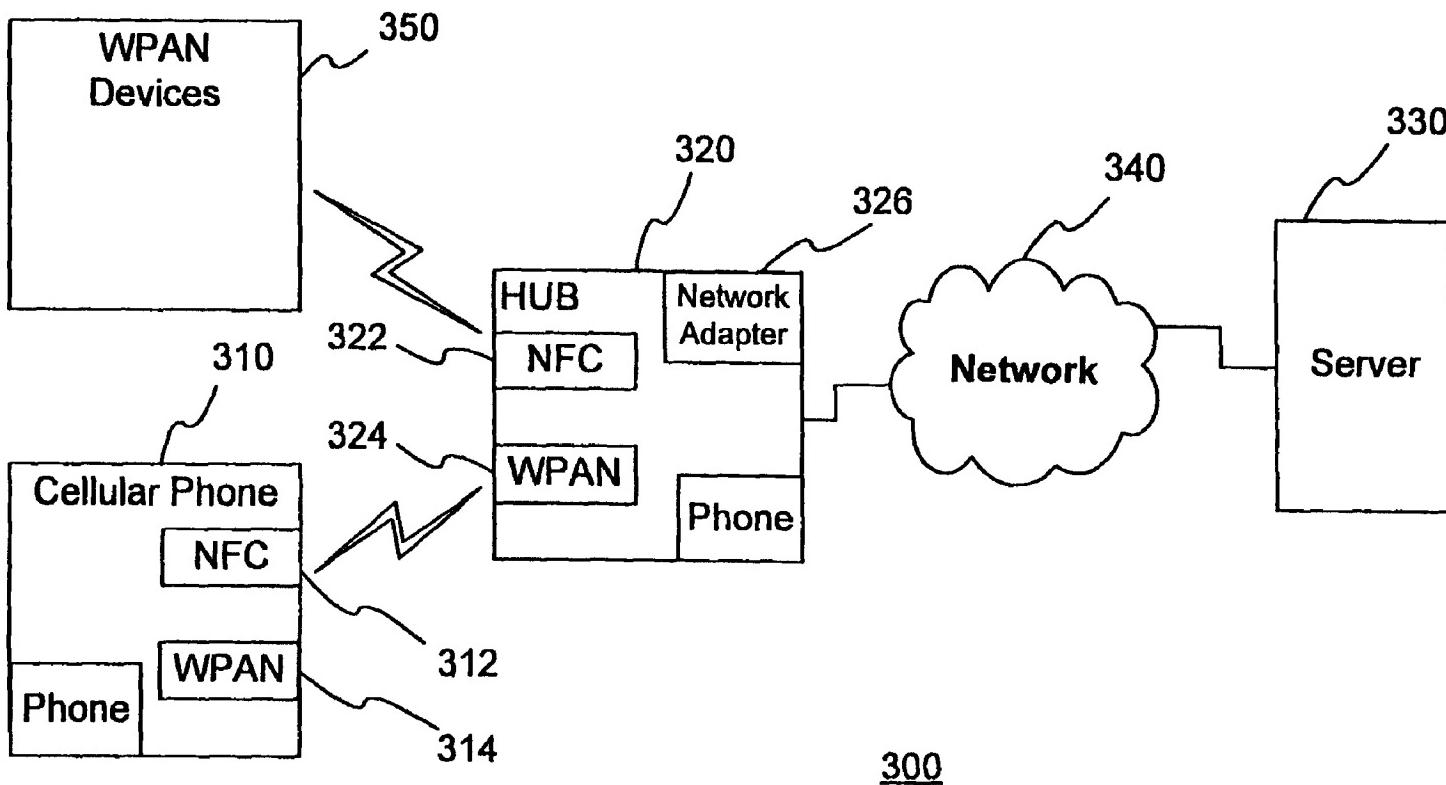


FIG. 3

A00353

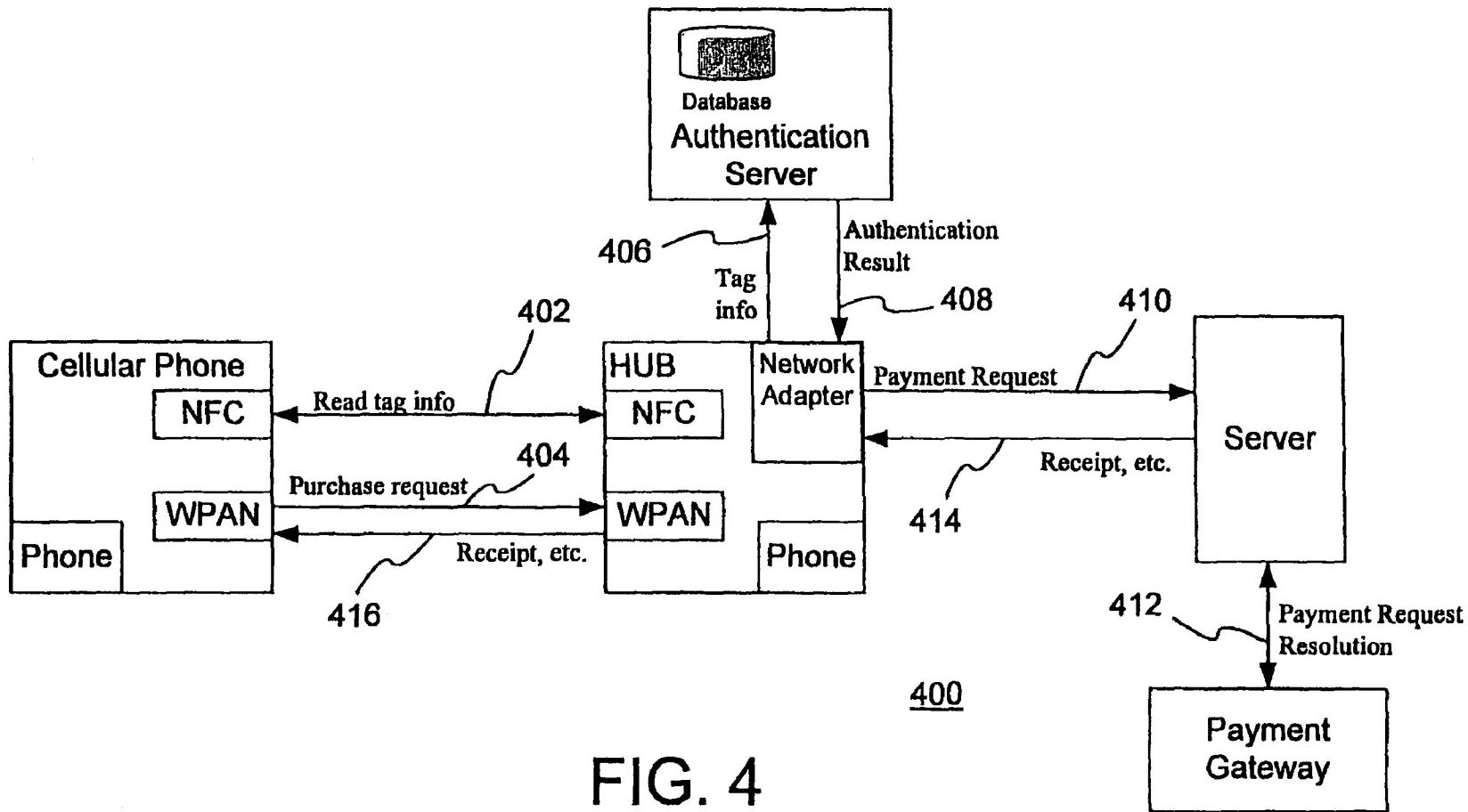


FIG. 4

U.S. Patent

Mar. 13, 2012

Sheet 5 of 20

US 8,135,398 B2

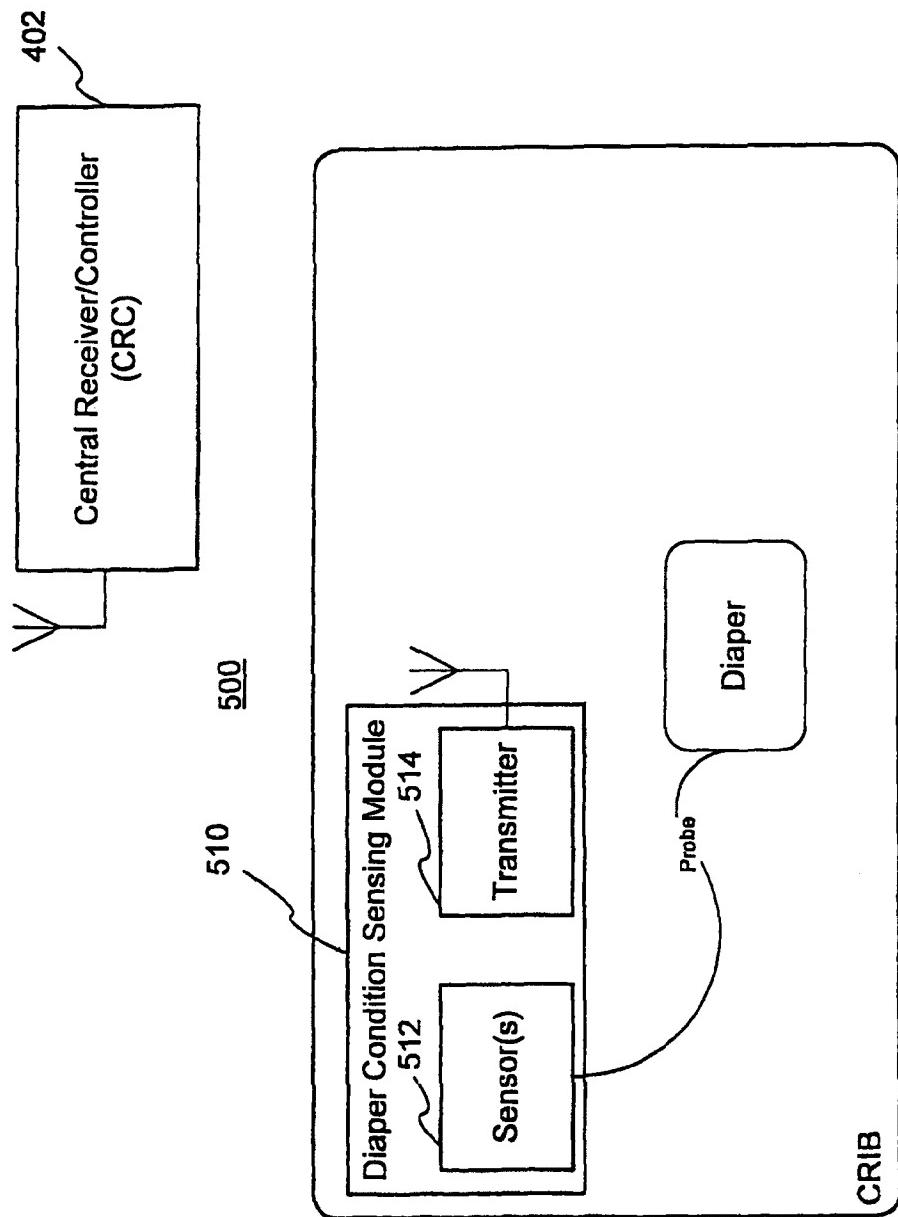


FIG. 5

U.S. Patent

Mar. 13, 2012

Sheet 6 of 20

US 8,135,398 B2

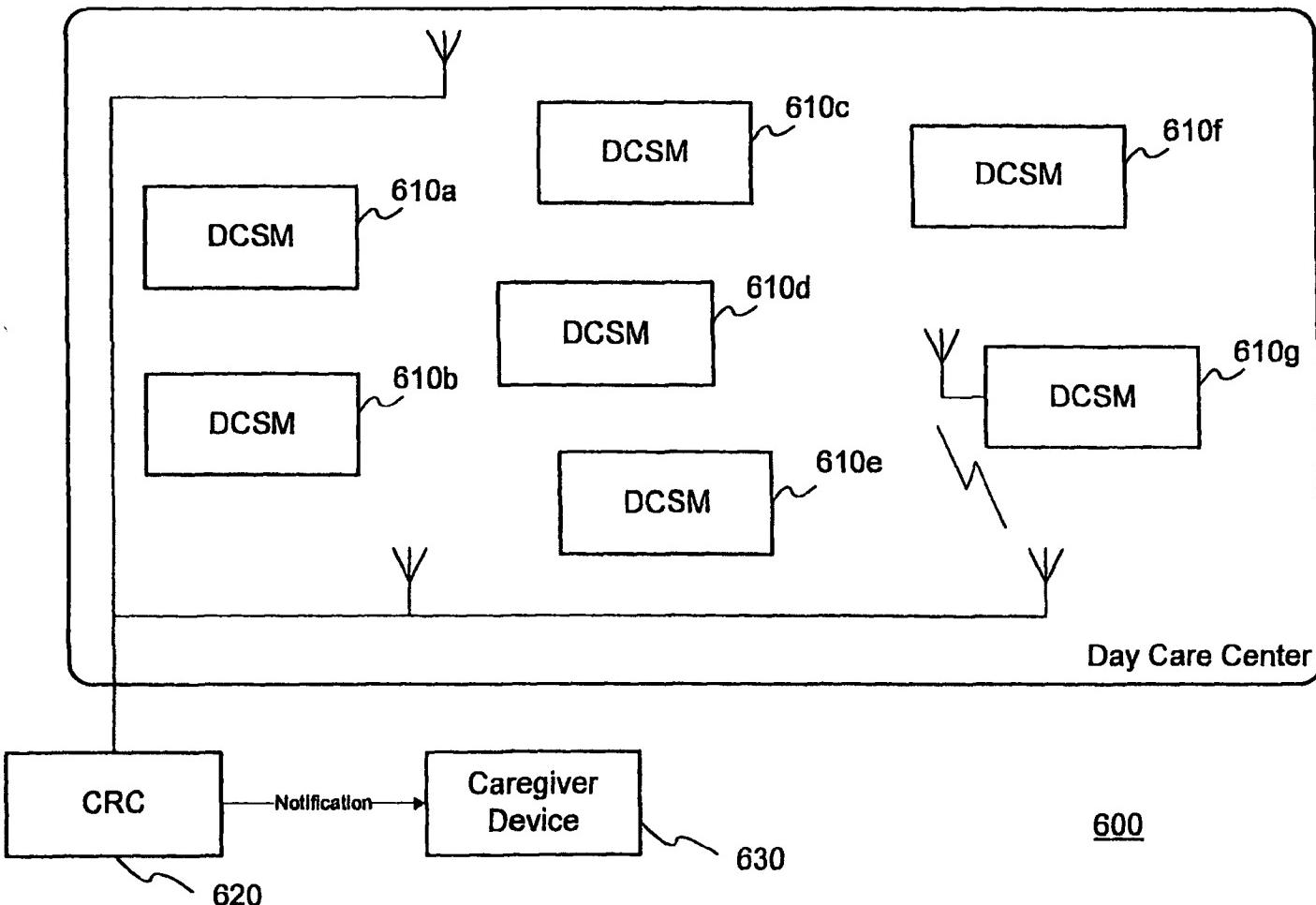


FIG. 6

A00356

U.S. Patent

Mar. 13, 2012

Sheet 7 of 20

US 8,135,398 B2

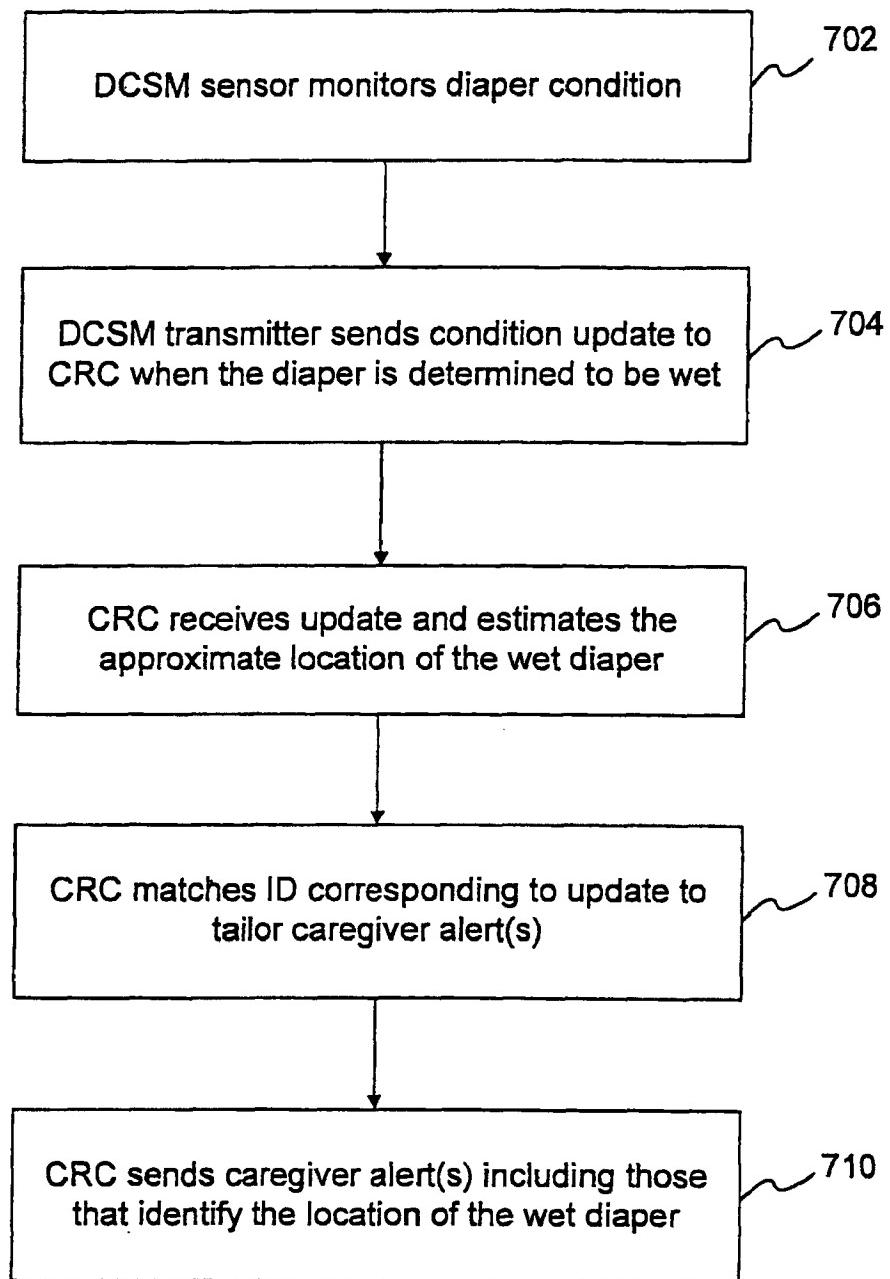
700

FIG. 7

A00358

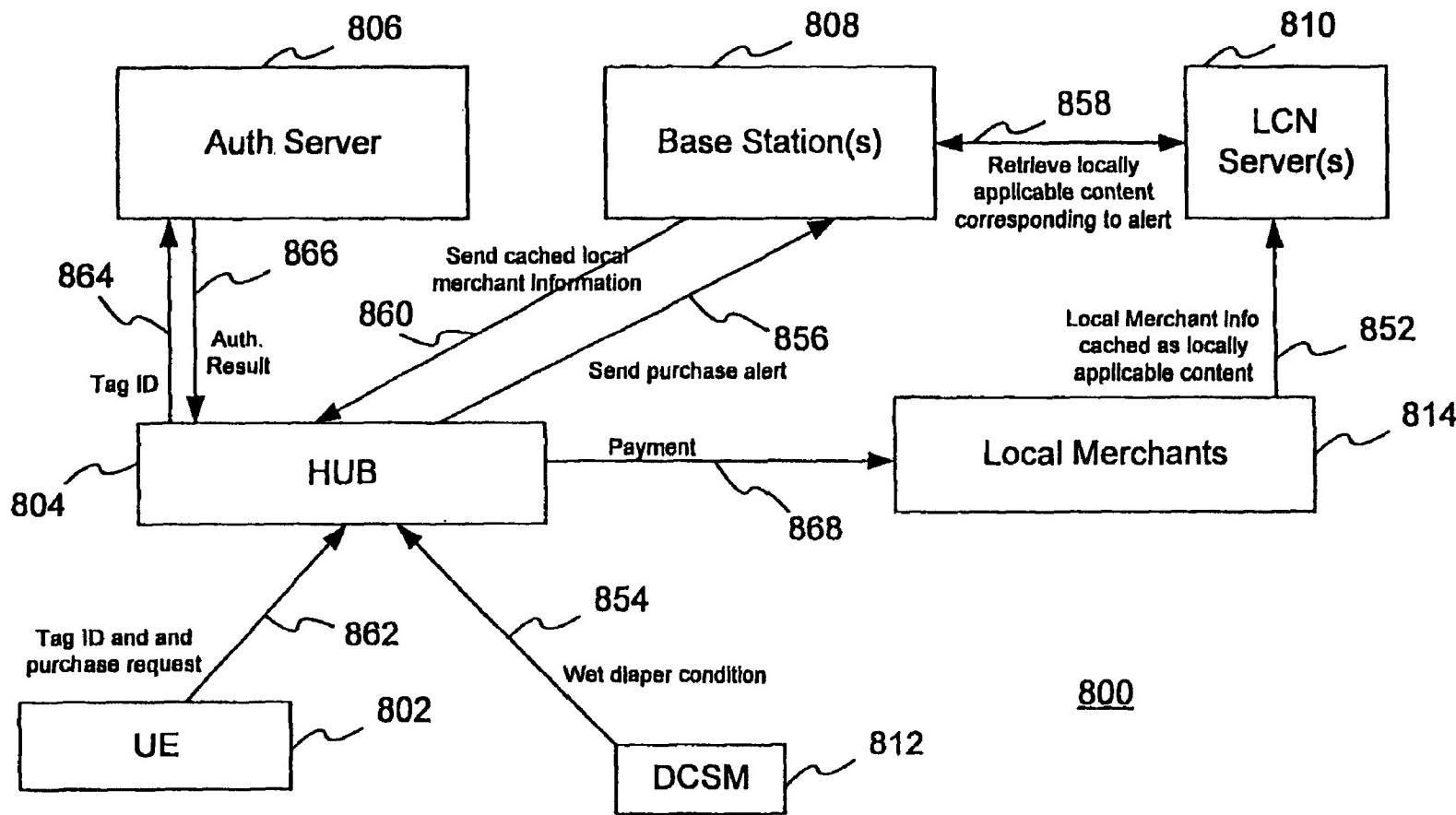


FIG. 8

U.S. Patent

Mar. 13, 2012

Sheet 9 of 20

US 8,135,398 B2

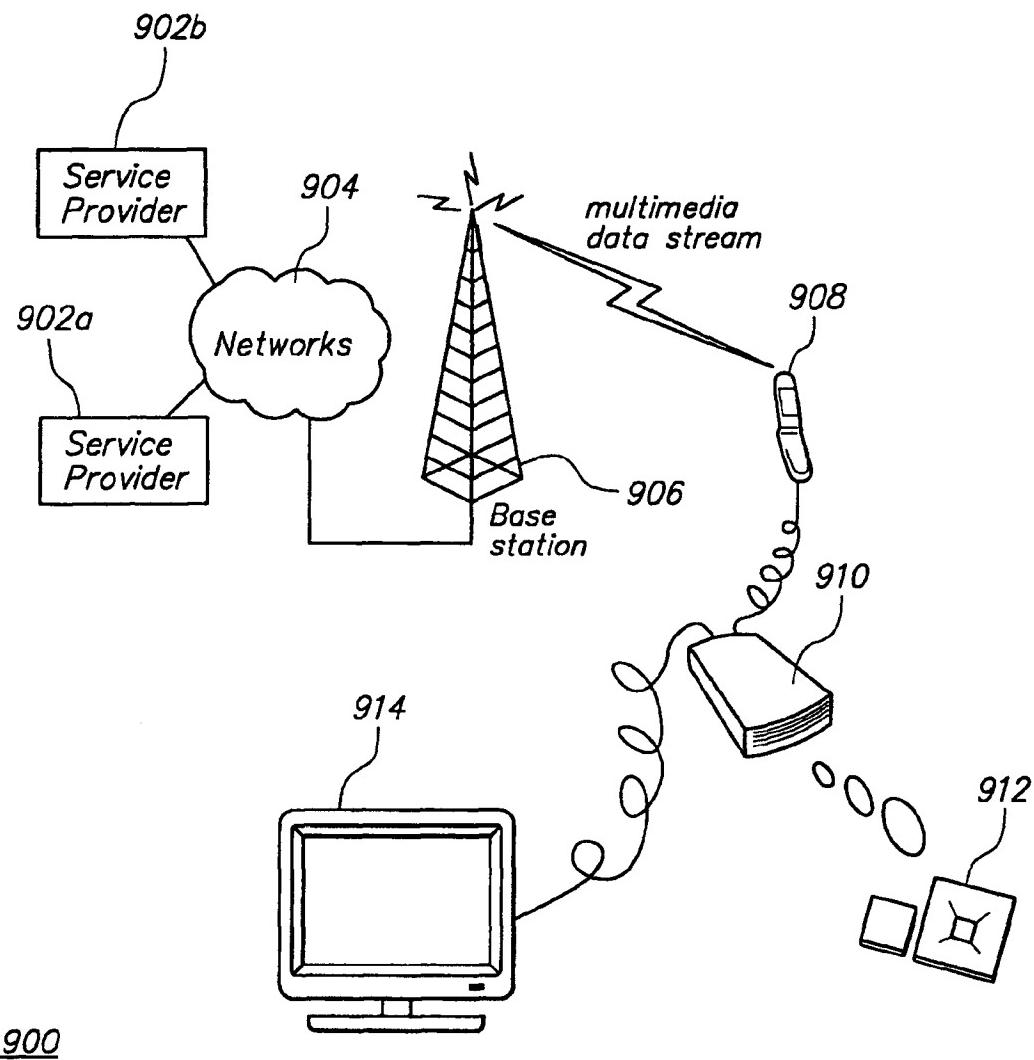


FIG. 9

U.S. Patent

Mar. 13, 2012

Sheet 10 of 20

US 8,135,398 B2

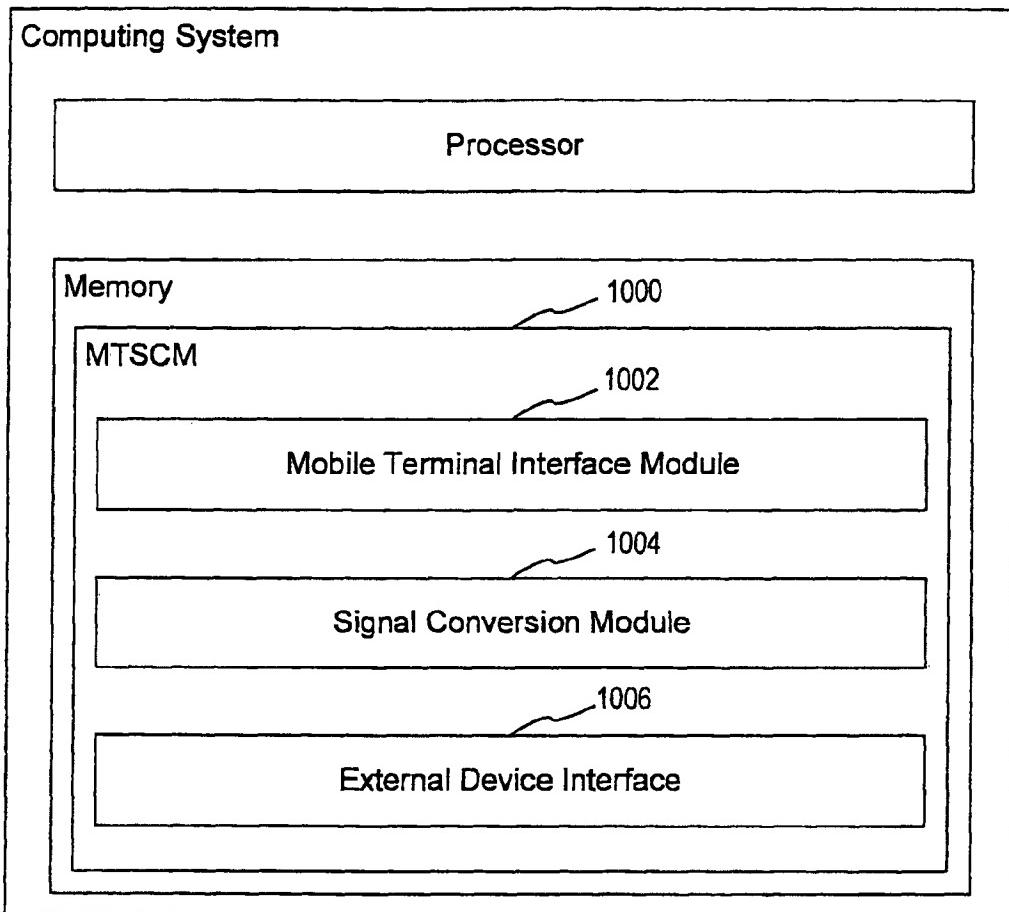


FIG.10

U.S. Patent

Mar. 13, 2012

Sheet 11 of 20

US 8,135,398 B2

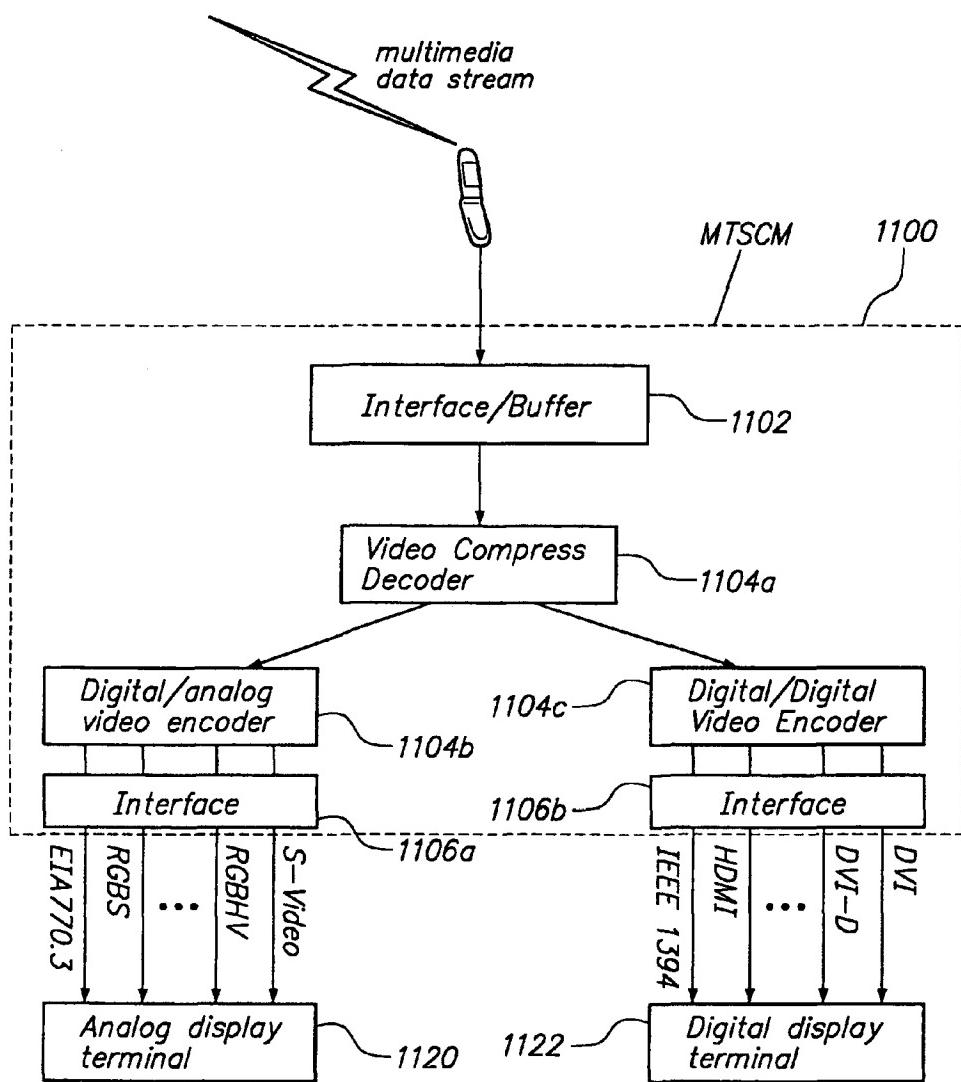


FIG. 11

U.S. Patent

Mar. 13, 2012

Sheet 12 of 20

US 8,135,398 B2

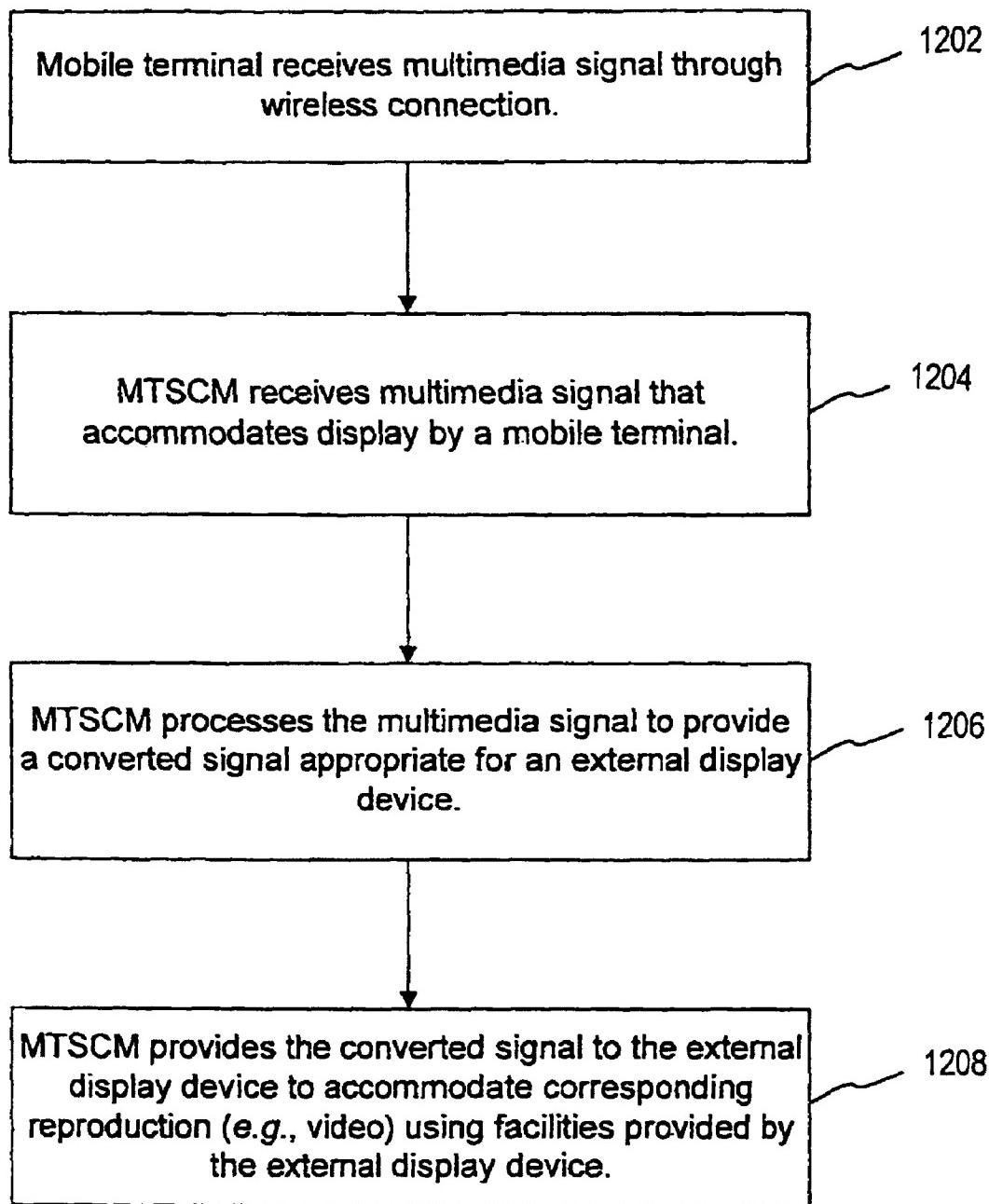


FIG. 12

U.S. Patent

Mar. 13, 2012

Sheet 13 of 20

US 8,135,398 B2

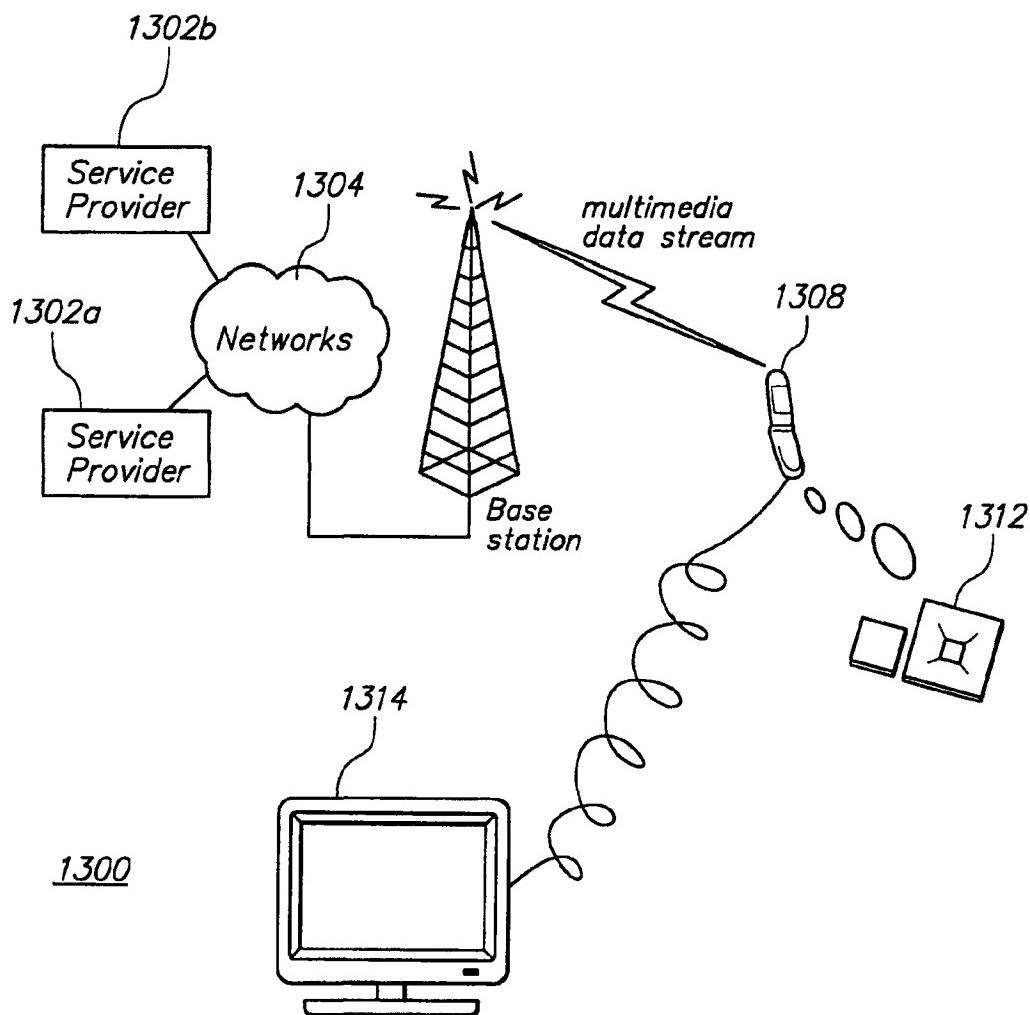


FIG. 13

U.S. Patent

Mar. 13, 2012

Sheet 14 of 20

US 8,135,398 B2

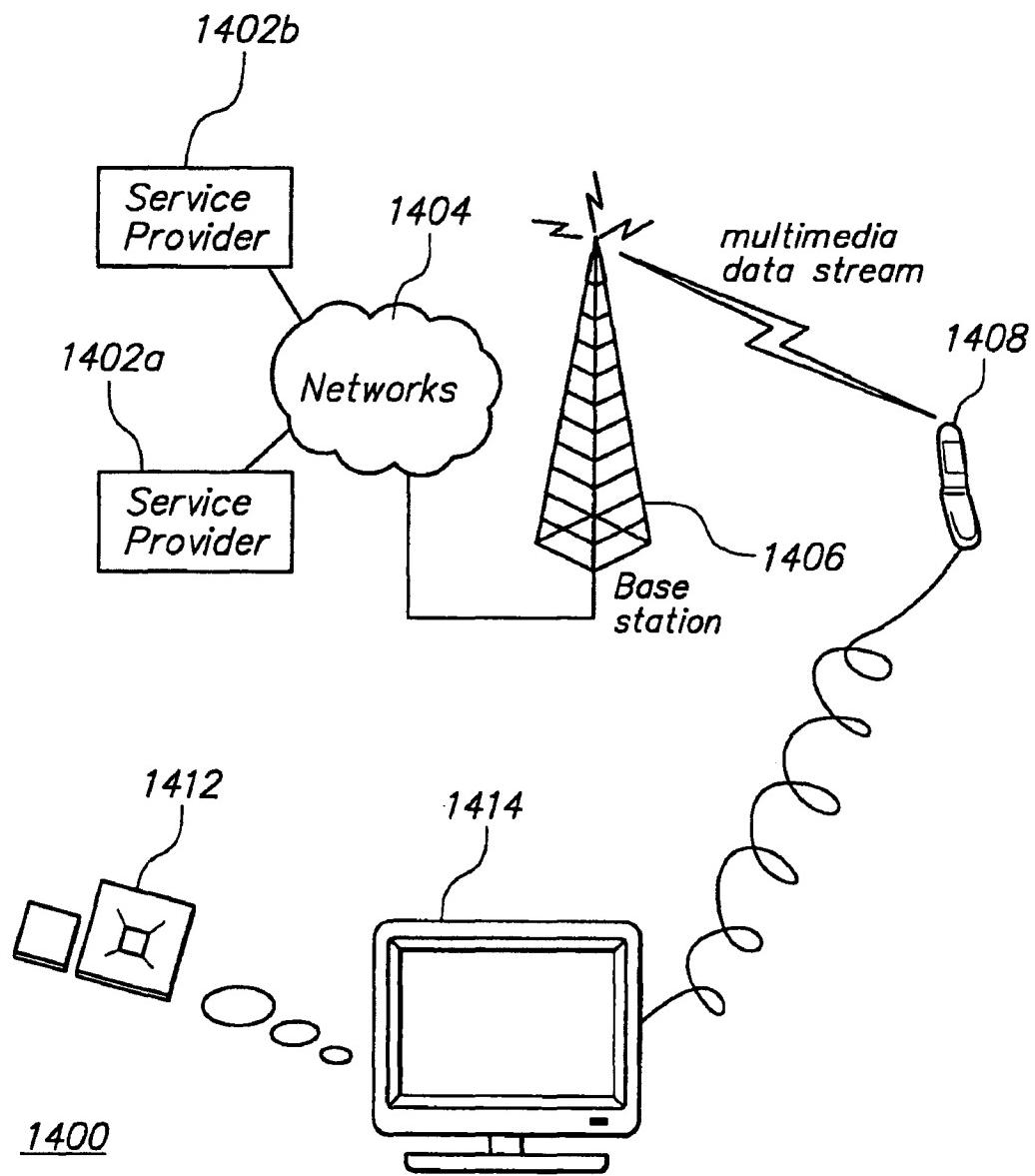


FIG. 14

U.S. Patent

Mar. 13, 2012

Sheet 15 of 20

US 8,135,398 B2

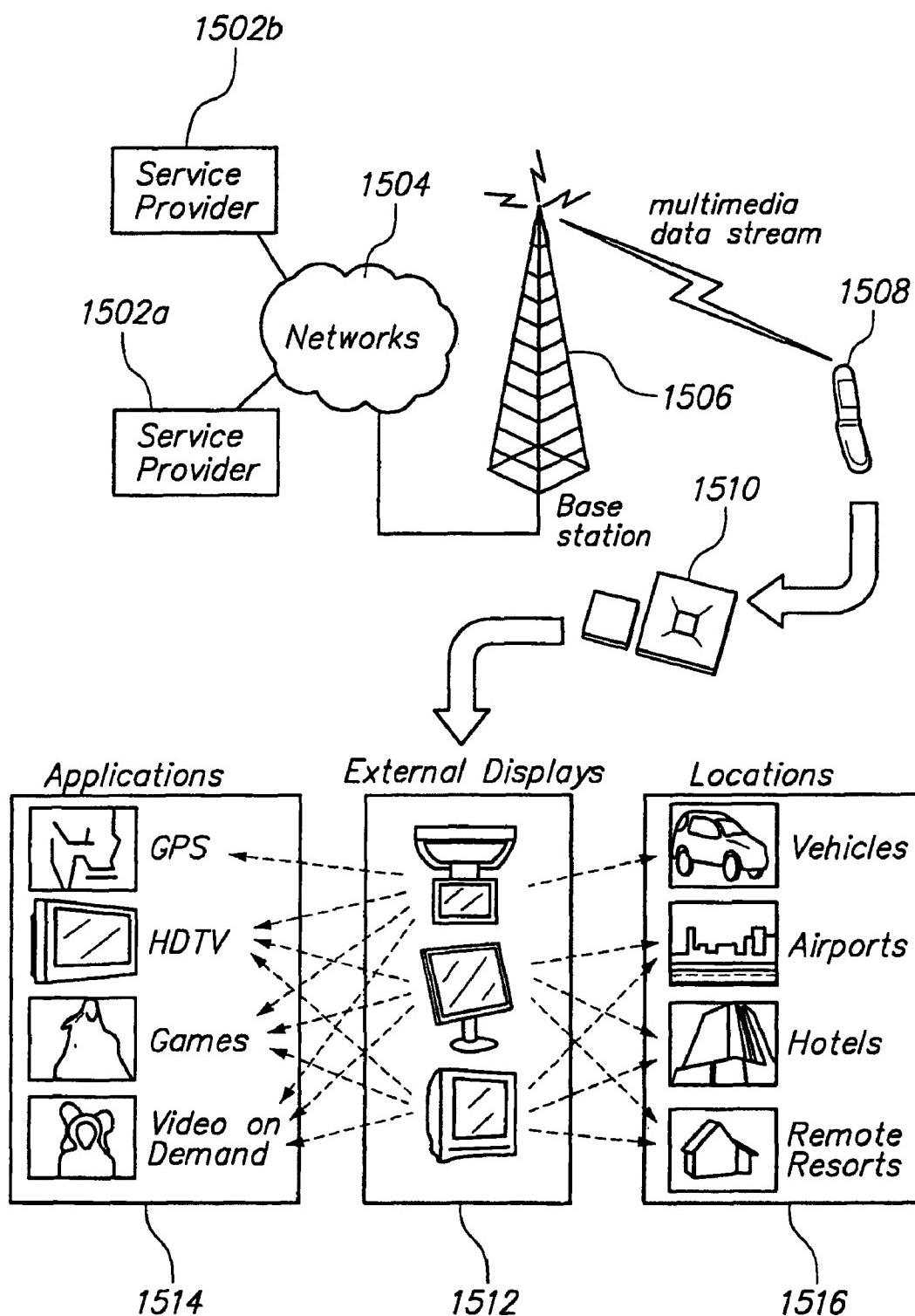


FIG. 15

U.S. Patent

Mar. 13, 2012

Sheet 16 of 20

US 8,135,398 B2

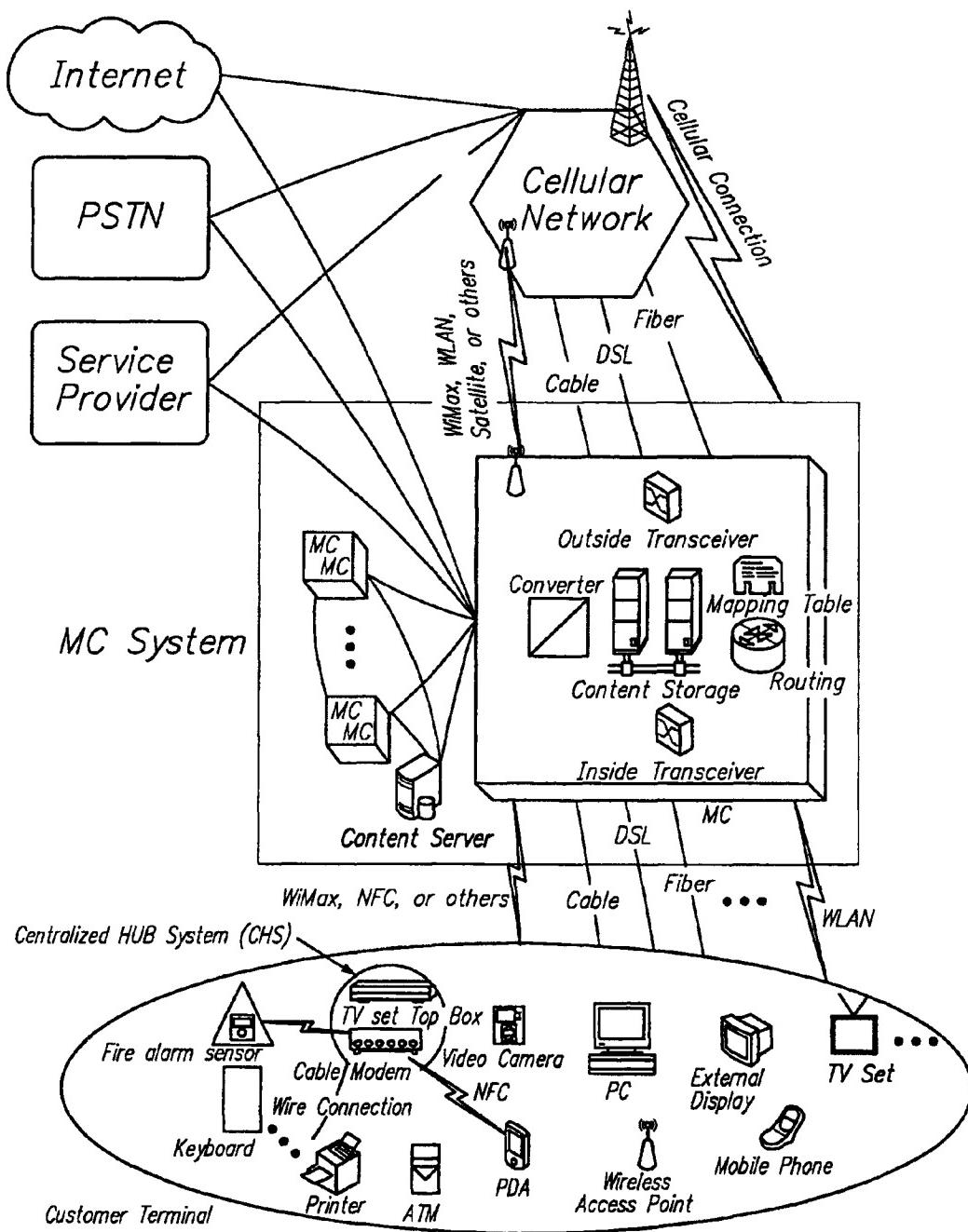


FIG. 16

U.S. Patent

Mar. 13, 2012

Sheet 17 of 20

US 8,135,398 B2

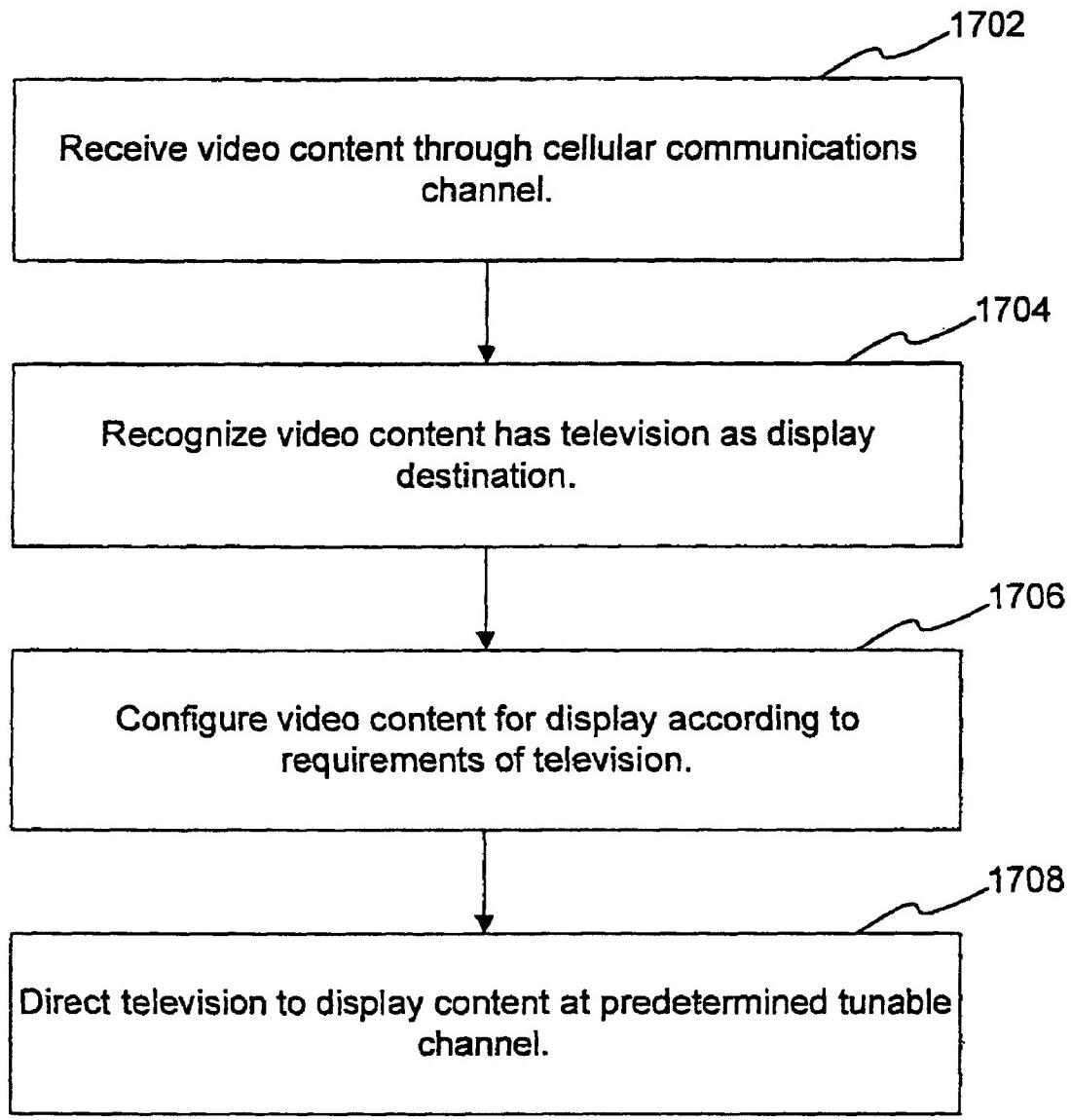


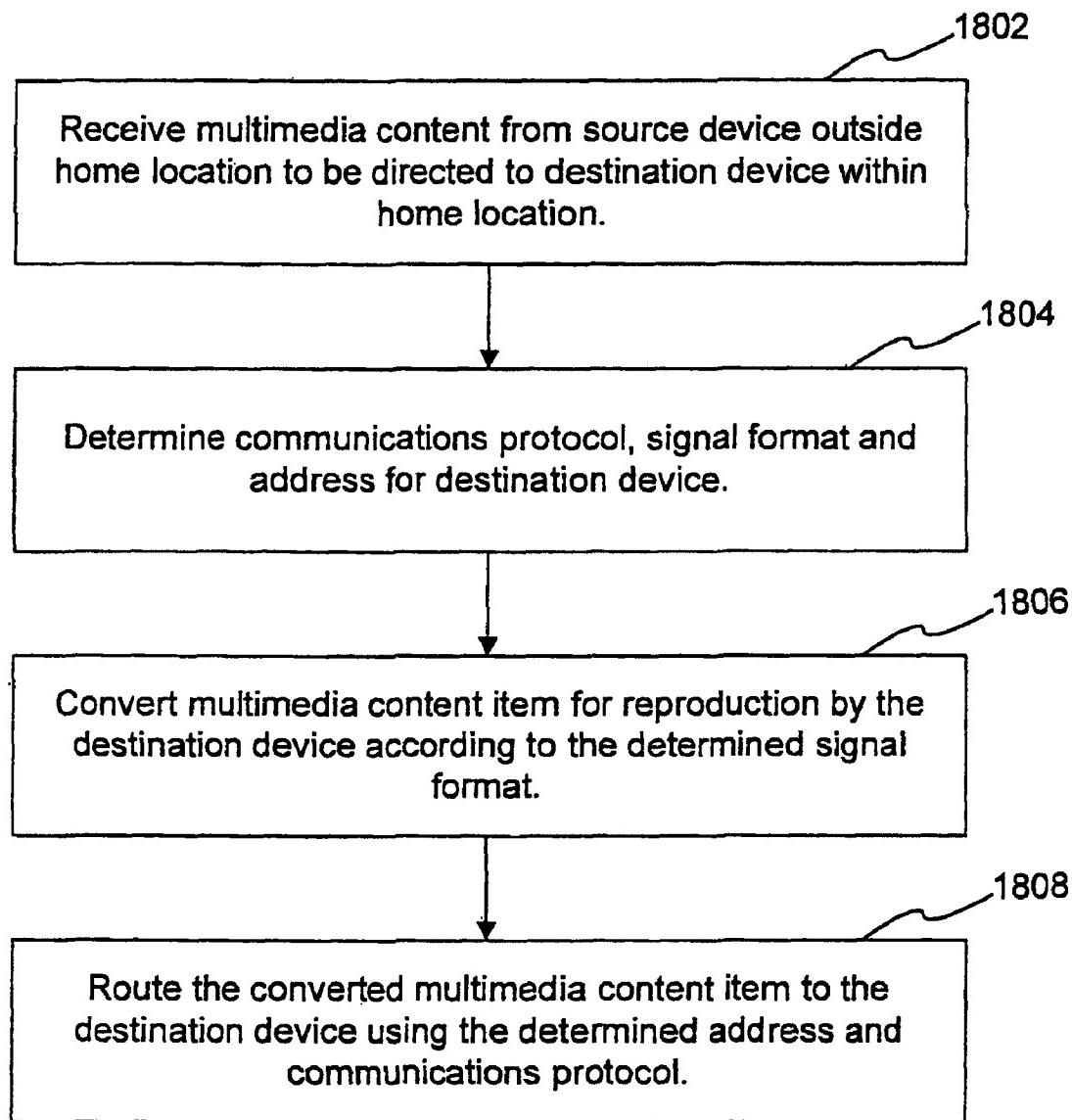
FIG. 17

U.S. Patent

Mar. 13, 2012

Sheet 18 of 20

US 8,135,398 B2

1800*FIG. 18*

U.S. Patent

Mar. 13, 2012

Sheet 19 of 20

US 8,135,398 B2

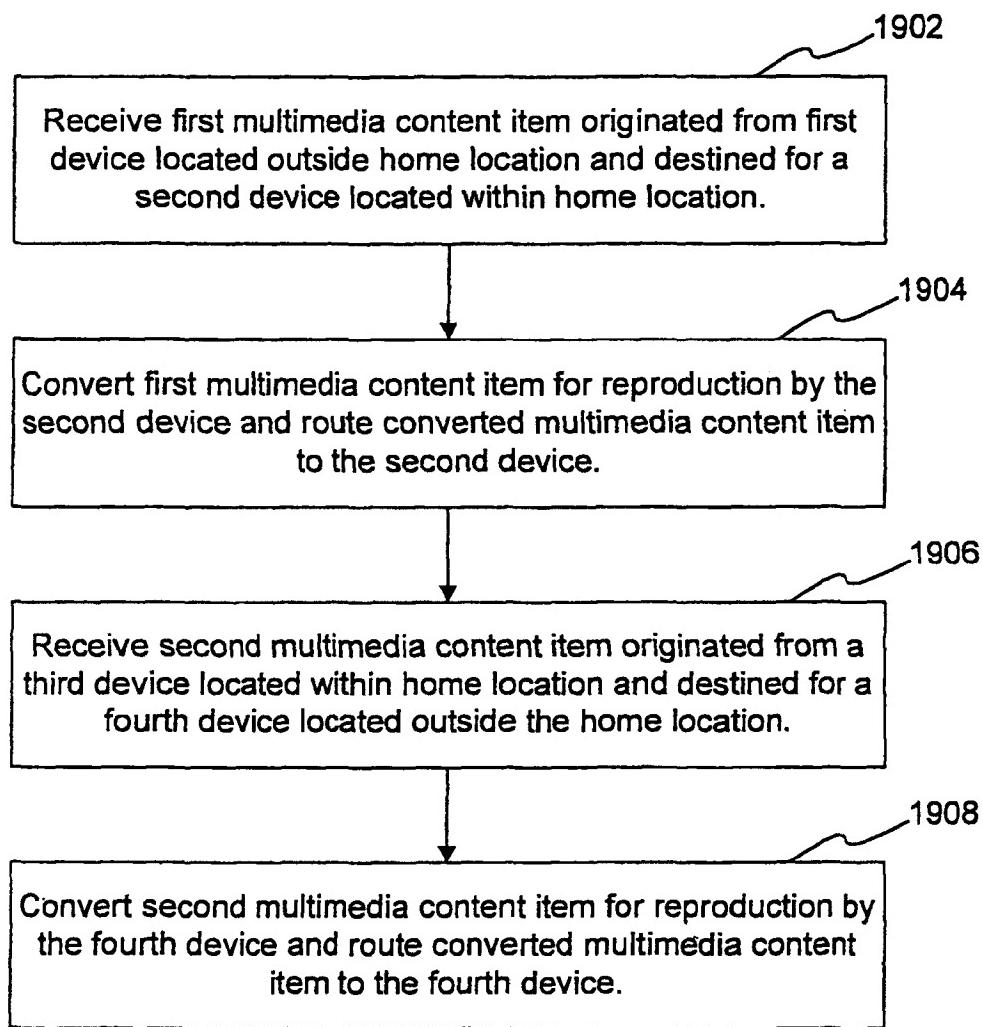
1900

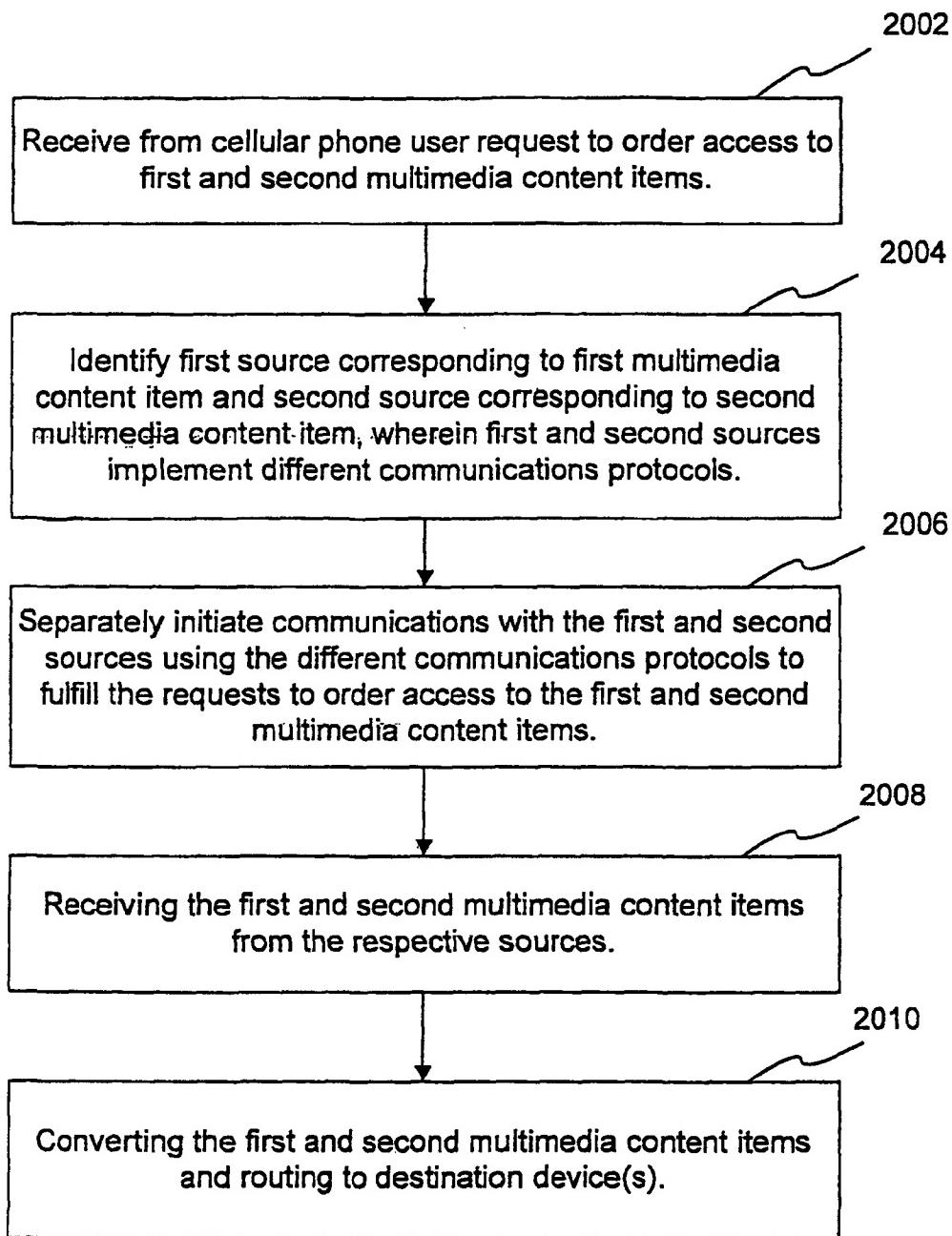
FIG. 19

U.S. Patent

Mar. 13, 2012

Sheet 20 of 20

US 8,135,398 B2



2000

FIG. 20

US 8,135,398 B2

1

**METHOD AND APPARATUS FOR
MULTIMEDIA COMMUNICATIONS WITH
DIFFERENT USER TERMINALS**

**CROSS REFERENCE TO RELATED
APPLICATIONS**

This application is a continuation of U.S. application Ser. No. 11/802,418, filed on May 22, 2007, which is a continuation-in-part of application Ser. No. 11/501,747, entitled "System and Method for providing Locally Applicable Internet Content with Secure Action Requests and Item Condition Alerts" and filed on Aug. 10, 2006, which claims priority to provisional Application Ser. No. 60/787,510, entitled "An Intelligent Kiosk for Mobile Payment" and filed on Mar. 31, 2006, and also claims the benefit of provisional Application Ser. No. 60/707,561, entitled "A Novel Structure of Cellular System for Internet Access" and filed on Aug. 12, 2005. The entire contents of these applications are hereby incorporated by reference.

As a continuation of U.S. application Ser. No. 11/802,418, this application is also a continuation-in-part of application Ser. No. 11/165,341, filed on Jun. 24, 2005 and entitled "Methods, Systems, and Apparatus for Displaying the Multimedia Information from Wireless Communication Networks," which claims priority to provisional Application Ser. No. 60/588,358, filed on Jul. 16, 2004 and entitled "A Method and System for Displaying the Multimedia Information from Wireless Communications or Portable IT." The entire contents of these applications are also hereby incorporated by reference.

As a continuation of U.S. application Ser. No. 11/802,418, this application is also a continuation-in-part of application Ser. No. 11/540,637, filed on Oct. 2, 2006 and entitled "A Method and System for Improving Client Server Transmission over Fading Channel with Wireless Location and Authentication Technology via Electromagnetic Radiation", which claims priority to provisional Application Ser. Nos. 60/722,444 filed on Oct. 3, 2005, 60/787,510 filed on Mar. 31, 2006, 60/832,962 filed on Jul. 25, 2006, and 60/899,037 filed on Feb. 2, 2007. The entire contents of these applications are also hereby incorporated by reference.

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates generally to providing multimedia content and more particularly to providing multimedia content to and from various different devices.

2. Description of the Related Art

Empowered by the next generation of wireless technology, cellular networks can provide users with access to information from the Internet such as video on demand, video conferences, databases, etc. The use of cellular phones is thus no longer limited to voice transmission.

However, there are still some problems with the delivery of Internet content through cellular phones. For example, even with the high bandwidth connection provided by advanced cellular Systems, there remains a bottleneck between the Internet and the cellular network (CN), as well as delays caused by the Internet itself. This condition hinders the ability of cellular phone users to fully exploit the capabilities of the advanced CN. Since smooth and effective data flow is important to users, this bottleneck hinders the adoption of cellular phones for Internet access.

Making payment requests is another area of need. Although more and more individuals have become accus-

2

tomed to purchasing goods and services online, there is not a streamlined and consistent mechanism for securely making requests for such payments.

Still another area of need relates to alerts. Locations including homes, offices, and other environments typically include computing devices as well as at least some form of network connection. Despite all of this connectivity, there are certain conditions for which adequate alerts remain unavailable. For example, billions of children wear diapers, and probably a quarter of them may suffer the effects of wet diapers at any given moment, since caretakers (e.g., parents, baby sitters, etc.) are not apprised of the status of their diapers in real time.

Thus, there remains a need for Systems and corresponding devices and processes that avoid the shortcomings of existing networks for delivering Internet content using the CN. There also remains a need for Systems and corresponding techniques for making payment requests. There also remains a need for Systems and corresponding techniques for delivering alerts to individuals such as caregivers tasked with managing a child in diapers.

Handheld mobile terminals (e.g., cellular phones, personal digital assistants (PDA)) continue to evolve both in terms of execution platform and functionality. It is believed that the much of the functionality provided by a personal computer (e.g., desktop or laptop) will ultimately become virtually available in handheld mobile terminals, which will allow users to work with and access multimedia information any time and anywhere.

For example, one particularly appealing advantage of the next generation wireless communication system and beyond (i.e., 3G, 4G, etc.) is the capacity to support high rate multimedia data services as well as conventional voice services. In a conventional cellular system a mobile terminal communicates with a base station wirelessly. Multimedia information including but not limited to television, 3D images, network games, and video phone calls is transmitted from various service providers and received for display on the screen of a mobile terminal. The net result of such a system is rich multimedia information being destined for display on the small screens typical of cellular phones (or the like).

In these and similar Systems, the mobile terminal functions as a multimedia terminal to display multimedia information (including high-resolution graphics and high-quality real-time audio/video) sent from high data rate wireless communications network. The limited size (e.g., 2x3") and capability of the mobile terminal screen may render enjoyment of the high rate data flow applications inconvenient, and in some instances useless. One consequence of this inadequacy is likely shrinkage of the potential market size for handheld mobile terminals. Indeed, some have suggested that development of high data rate Systems such as 3G Systems may be pointless given the limitations imposed by the small screen.

Some mobile units appear to provide a remote control function to an external display system. However, these do not appear to solve the small screen problem outlined above. That is, they do not accommodate display on a larger, external display of video and other multimedia information originally destined for the mobile terminal display screen.

For example, one such interface accommodates usage of the mobile terminal as a remote control for a television, by feeding programming guide information to the mobile terminal. This is useful for allowing the programming guide to be viewed locally while the larger screen displays a current program, but does not address the above-described small screen problem.

Still another issue is the various different devices that a user may have to engage in communications, as well as the various

US 8,135,398 B2

3

different vehicles for the enjoyment of content that the user now has. No longer does the typical user merely watch television. Instead, the user may use their home computer, television, MP3, PDA, cellular phone or various hybrid devices to enjoy content. This content also arrives from a variety of sources, not just broadcast television as in the past. While it may be desirable to have more options, some consumers may feel overwhelmed trying to manage everything.

What is needed is a solution to the problem of diminished user enjoyment of the various devices and corresponding content that a user may enjoy due to the complications of trying to manage content and interface with a variety of different devices that are not necessarily compatible.

SUMMARY OF THE INVENTION

The present invention provides methods and apparatus for multimedia communications with different user terminals, delivering multimedia information to multiple user terminals concurrently, dynamically, and efficiently.

According to one aspect, directing a television display from a mobile terminal such as a cellular phone is provided. This may entail receiving video content originated from the mobile terminal through a cellular communications channel, recognizing that the video content has a display destination of the television, configuring the video content for display on the television, and directing the television to display the video content at a predetermined tunable channel upon recognition that the received video content originates from the mobile terminal and has the display destination of the television. In addition, the communication between a mobile terminal and a television may be bidirectional.

According to another aspect, conversion and routing of content to devices that employ differing communication protocols is provided. This may entail receiving a multimedia content item originated from a source located outside a home location and destined for a destination device located within the home location, determining a communications protocol, a signal format and an address for the destination device, converting the first multimedia content item for reproduction by the destination device according to the determined signal format, and routing the converted multimedia content item to the destination device using the determined address and communications protocol. A plurality of user terminals may be served concurrently according to one embodiment of the present invention.

According to another aspect, bidirectional conversion and routing of content to differing devices is provided. This may entail receiving a first multimedia content item originated from a first device located outside a home location and destined for a second device located within the home location, converting the first multimedia content item for reproduction by the second device and routing the first converted multimedia content item to the second device, receiving a second multimedia content item originated from a third device located within the home location and destined for a fourth device located outside the home location, and converting the second multimedia content item for reproduction by the fourth device and routing the second converted multimedia content item to the fourth device. The third device can also be the second device and the fourth device can also be the first device.

According to another aspect, remotely receiving and accommodating completion of multimedia content requests from a plurality of content sources is provided. This may entail receiving a request to order access to a first multimedia content item and a second multimedia content item, wherein

4

the request is received through a cellular communication with a user initiating the request using a mobile terminal, identifying a first source corresponding to the first multimedia content item and a second source corresponding to the second multimedia content item, wherein the first source and the second source implement different communications protocols, separately initiating communications with the first source and the second source using the different communications protocols to fulfill the request to order access to the first multimedia content item and the second multimedia content item, receiving the first multimedia content item and the second multimedia content item from the first source and the second source; and converting the first multimedia content item and the second multimedia content item for reproduction by a destination device and routing the converted multimedia content items to the destination device.

According to another aspect, a method for optimizing the delivery of content that is commonly requested by a plurality of users in a particular location is provided. This may entail monitoring network content requested by users corresponding to the particular location, receiving a request for a particular content item from a given user in the particular location, wherein the particular content item is ordinarily served from a location outside the particular location, determining that the particular content item is locally applicable where the particular content item is also requested by and converted for other users in the particular location, and concurrently serving the particular content item to the given user and the other users using a server that is logically proximate to users in the particular location, in lieu of separately serving the particular content item to the given user and the other users from locations outside the particular location.

The present invention can be embodied in various forms, including business processes, computer implemented methods, computer program products, computer systems and networks, user interfaces, application programming interfaces, and the like.

BRIEF DESCRIPTION OF THE DRAWINGS

These and other more detailed and specific features of the present invention are more fully disclosed in the following specification, reference being had to the accompanying drawings, in which:

FIG. 1 is a block diagram illustrating a system for optimized delivery of Internet content to users.

FIG. 2 is a flow diagram illustrating an embodiment of a process for determining locally applicable content for optimized content delivery.

FIG. 3 is a block diagram illustrating a system for facilitating secure receipt and satisfaction of an action request such as a bill payment.

FIG. 4 is a block diagram illustrating an example of an action request process.

FIG. 5 is a block diagram illustrating a system for providing item status updates.

FIG. 6 is a block diagram illustrating a system for receiving and delivering a status update for multiple items.

FIG. 7 is a flow diagram illustrating a process for providing a diaper condition update.

FIG. 8 is a block and event diagram illustrating the provision of locally applicable Internet content to a user in relation to a status update, and secure receipt and satisfaction of an action request related to the same.

FIG. 9 is a schematic diagram illustrating an example of a system in which mobile terminal signal conversion may reside.

US 8,135,398 B2

5

FIG. 10 is a block diagram illustrating an example of a mobile terminal signal conversion module.

FIG. 11 is a block diagram illustrating another example of a mobile terminal signal conversion module.

FIG. 12 is a flow diagram illustrating an embodiment of a process including mobile terminal signal conversion.

FIG. 13 is a schematic diagram illustrating another example of a system in which mobile terminal signal conversion may reside.

FIG. 14 is a schematic diagram illustrating still another example of a system in which mobile terminal signal conversion may reside.

FIG. 15 is a schematic diagram illustrating examples of mobile terminal signal conversion applications.

FIG. 16 is a schematic diagram illustrating a control system of multimedia communications of different user terminals.

FIG. 17 is a flow diagram illustrating an example of directing a television to display content using signals received from a remote location through a cellular communications network.

FIG. 18 is a flow diagram illustrating an example of converting and routing multimedia content to different terminals.

FIG. 19 is a flow diagram illustrating an example of bidirectional operation involving transmitting and routing multimedia content into and out of the home.

FIG. 20 is a flow diagram illustrating an example of receiving and accommodating completion of multimedia content requests corresponding to different sources.

DETAILED DESCRIPTION OF THE INVENTION

In the following description, for purposes of explanation, numerous details are set forth, such as flowcharts and system configurations, in order to provide an understanding of one or more embodiments of the present invention. However, it is and will be apparent to one skilled in the art that these specific details are not required in order to practice the present invention.

According to one aspect of the present invention, Internet content is requested and accessed by cellular users in correlation with their determined location. Provision of Internet content is customized according to location, and provided in a series of locally customized networks. A given local network includes servers configured to include content believed appropriate for its location. The delivery of content is made from a particular local network configured as such, to a user's cellular phone through the local base station.

For example, information about Hollywood may be accessed through cellular network base station(s) in the Hollywood area, when the cellular user is detected as being proximate to the Hollywood area. These base stations deliver Internet content that is relevant to the area, such as web sites about film and movie stars. This Internet content is stored in servers that the base stations covering the area can access conveniently to provide faster and more efficient transmission to the cellular users in the service area.

By optimizing the location of the Internet content for the wireless network users, this invention enables an optimum data flow for cellular users to access rich information and data of all kinds from the Internet.

FIG. 1 is a block diagram illustrating a system 100 configured to provide Internet content delivery in accordance with the present invention. The basic elements of the system 100 are the User Equipment (UE) 110, the Radio Access Network (RAN) 120, the Core Cellular Network (CCN) 130, the External Network (EN) 140, and the Local Customized Network (LCN) 150.

6

The UE 110 is a cellular phone configured to communicate with base station(s) of the RAN 120. Although the UE 110 is preferably a cellular phone, it should be understood that a variety of devices may be equipped with same communication functionality. Other examples of the UE 110 include a Personal Digital Assistant (PDA), Set Top Box, Kiosk, or any personal computing device configured to include the wireless communication capability.

The RAN 120 and CCN 130 preferably implement conventional elements of a cellular network and are described further as follows. The RAN 120 includes Base Station and Radio Network Controller (RNC) elements. The Base Station provides resource management and provides an interface that converts the data flow between the UE 110 and RNC. The RNC controls radio resources for the Base Stations to which it is connected, and also manages connections to the UE 110.

The CCN 130 is connected with the EN 140. The most notable examples of the EN 140 can be grouped into two kinds: Circuit Switched (CS) 142 networks and Packet Switched (PS) 144 networks. The CS 142 network provides circuit-switched connections for circuit-switched services, such as telephony and ISDN. The PS 144 network provides connections for package data services. The Internet is a significant and notable application of a PS network.

The CCN 130 comprises MSC/VLR, GMSC, HLR, SGSN and GGSN elements. The HLR (Home Location Register) is a database that stores information such as user service profiles. The service profile includes information including allowed services, roaming areas, forwarding numbers and the like. The HLR stores the UE 110 location to accommodate that routing of calls and other information to the UE 110.

The MSC/VLR (Mobile Services Switching Center and Visitor Location Register) respectively provide switch operations and a database for the UE in its current location for Circuit Switch (CS) services. The VLR stores the user's service profile, as well as more precise information on the UE's location within the serving system. CS connections go through the GMSC (Gateway MSC), which is the switch at the point of connection to the external CS network.

The SGSN (Serving GPRS (General Packet Radio Service) Support Node) functionality is similar to that of MSC/VLR but is typically used for Packet Switch (PS) service. PS connections go through the GGSN (Gateway GPRS Support Node).

The LCN 150 comprises one or more computing devices configured to include memory, processing capability, and interfaces to provide the functionality described herein. The LCN 150 includes local servers that are configured to provide custom Internet content. The LCN 150 is also configured to include a content access monitoring module, which monitors Internet access and determines content applicable to the designated location of the LCN 150.

The LCN 150 thus performs monitoring and caching related to locally applicable content. With regard to the monitoring functionality, the monitoring includes local access, which determines which content users in the location are accessing. With regard to the caching functionality, the LCN 150 maintains a cache of locally applicable Internet content, which includes refreshing to add new content and remove stale content as determined by information received from the monitoring functionality.

One technique for determining whether content is locally applicable is measuring access frequency. If many users in the location are determined to be accessing particular Internet content, then that particular Internet content is determined to be locally applicable and is included in the cache during the next update.

US 8,135,398 B2

7

In addition to monitoring and caching locally applicable content, the LCN 150 is configured to be logically proximate to the base station(s) of the cellular network at the particular location. In one example, logical proximity is carried out by having the LCN 150 physically proximate to the relevant base station(s), such as in the same geographical area. For example, the LCN 150 may be located in a metropolitan area or within an area that covers certain zip code(s) of a metropolitan area. Logical proximity may alternatively be carried out without requiring physical proximity. This, for example, may be done by providing dedicated resources including a high bandwidth connection between the LCN 150 and the local users. In this example, the LCN 150 is configured to deliver locally applicable content more efficiently and rapidly because of the dedicated resources, without necessarily requiring physical proximity.

According to another aspect, to further increase efficiency, the locally applicable content for a given LCN is organized in a layered architecture. A "first layer" of content is considered to be the content that has the highest local applicability. Additional layers are also provided upon the first layer, with succeeding layers progressively covering larger geographical areas (i.e., progressively larger numbers of base stations). According to one aspect, the layering involves communication with neighboring LCNs covering increasing areas, to determine the content that is locally applicable for the additional levels. Thus, for example, a first layer corresponds to locally applicable content at a first level of granularity (e.g., as monitored/determined only for the location of the LCN or a small local group of LCNs), a second layer corresponds to locally applicable content at a second level of granularity (e.g., the logical "AND" or intersection of content that is frequently accessed across a larger area as determined by the monitoring of access for several LCNs in the defined larger area, and so on).

The operation of the system to update the LCN accordingly is described as follows, with concurrent reference to FIG. 1 and the flow diagram of FIG. 2. The process commences by monitoring 202 Internet content accessed by users for a current location. This is done by monitoring the gateway of the connection between the CCN 140 and PS 144 networks to track the Internet content accessed by the cellular users.

It is noted that the monitored content may have two useful purposes. One is to accommodate the delivery of locally applicable content, which may be determined by frequency of access for the given location. Another is to allow the providers of content (e.g., merchants or other commercial entities) to receive an indication which content is locally applicable. This allows the providers of content to assist or participate further in determining what is locally applicable. For example, a merchant provided with an indication of local applicability for certain content may wish to make advertisements, coupons, or the like available to the users in that domain.

In conjunction with this monitoring 202, determination(s) 204 of the base station(s) from which requests for the Internet content are made. This may be performed by checking the VLR and HLR to discover the base stations from which the requests for the Internet content are sent from through. It is noted that base station discovery is just one way that physical location may be determined. Other examples include but are not limited to using GPS, zip code, telephone number, and IP address information to make the determinations.

The next step comprises determining 206 locally applicable content based upon the monitoring 202 and determination(s) 204 of the base station(s). Determination of local applicability is performed by determining access frequency. Alternatively, local applicability may be determined by com-

8

paring the location of the requesting user (base station) to a location that is identified in association with the requested content.

Then, for the current (e.g., first) layer, the content is loaded 5 208 in servers that are logically proximate to users for the given location. This may be done by placing the current (e.g., first) layer server(s) loaded with the Internet content and/or other information/data to achieve an optimum and faster data transmission for the cellular users to access the data stored in 10 the servers through the base stations. For example, the servers can be placed logically close to the base station through which the cellular users access the data stored in the server(s).

The process iterates through as many layers as desired. If it is determined 210 that additional layers are to be updated, then steps 202-208 are performed to load the next 212 (e.g., second) layer server(s) with locally applicable content. As 15 described, this preferably entails a broader geographical area as the layers increase. The process continues until it is determined 210 that no more layers need to be determined and loaded. The number of layers in a given system will vary 20 according to application, and as desired. Layering will typically involve a trade-off between maximizing locally available content and the processing resources required to generate and manage layers for progressively broader areas.

The content that is loaded into the base station(s) may be 25 refreshed 214 on any desired schedule or trigger. For a refresh operation, the process described above repeats, starting again with the first layer. Content that is stale or otherwise determined to no longer be locally applicable may be removed, and of course new content may be added during a refresh cycle.

Additional servers may be added vertically and/or horizontally as desired. Vertically means that servers may be added at a given physical location to cover first, second, third, etc. 30 layers. Horizontally refers to adding different sets of servers corresponding to different locations (i.e., one set for the first layer, a second set for the second layer, and so on).

A regular schedule or certain amount of activity can be used to trigger a refresh of the layering. The Internet content 35 in the LCN 150 servers is modified according to the updated findings on the requests for the Internet content sent from the base stations. The Internet content stored in the servers is refreshed at a proper time, such as when the servers are not overwhelmed by the users accessing the contents.

The servers are thus loaded with the information for broadcast and/or multicast and/or any data to be accessed by the 40 cellular users for an optimum transmission to the users in service areas.

The locally applicable content may be sent and delivered 45 upon request to the users. Examples of communication pathways for sending the locally applicable Internet content include the relatively direct pathway through the RAN 120, the pathway through the CCN 130 and then the RAN 120, or others.

50 A variety of techniques may be used to implement the locally applicable content cached by the LCN 150 in conjunction with requests for Internet content by UE 110 (or other device) users. In one example, the UE 110 request for Internet content prompts an initial check for content in the locally applicable content.

55 The pathway through the CCN 130 and then the RAN 120, or others. Additionally, based upon the layered approach described above, the first attempt to satisfy the request may be made from the first layer, followed by the second layer, and so on. The number of layers searched to respond to a particular request may vary as desired. When the number of layers designated to be searched

US 8,135,398 B2

9

for the current request is exhausted, conventional Internet access is used to retrieve content related to the request.

Various cache management and network optimization techniques may be used to manage the locally applicable content. For example, fully associative (FA), direct mapped (DM), and set associative (SA) mechanisms are examples of techniques that can be used to determine where a specific content can be stored on the server. Additionally, techniques to ensure block validity and to manage cache hits and misses can also be used. Random, LRU (Least Recently Used) and FIFO (First In First Out) block replacement schemes are among those that can be used to manage the blocks in the cache.

According to another aspect, the present invention facilitates a systematical solution for mobile payment (or the communication of other information, as well as the receipt of information such as alerts). Preferably, this aspect of the present invention implements a cellular network, a wireless personal area network (WPAN) and wireless identification technology. Various technologies may be used for these components, including but not limited to 3G technology for the cellular network; Zigbee, Bluetooth, or UWB technologies for the WPAN; and RFID (e.g., NFC) for the wireless identification technology.

FIG. 3 illustrates an example of a system 300 that implements this aspect of the present invention. The system 300 includes a user equipment (e.g., cellular phone, PDA, etc.) 310 and wireless HUB 320, which is connected to servers 330 through a network 340, such as the Internet.

The wireless HUB (WHUB) 320 may be located in a public or private location. For a public location, the WHUB 320 is preferably housed in a kiosk. The kiosk may be located on a street, or in an airport, shopping mall, or any location that is perceived as convenient and likely to include user traffic. For private locations, the WHUB 320 is preferably configured for usage in locations like homes or hotel rooms. In these environments, the WHUB 320 may be provided in a smaller device such as part of a Set Top Box (STB).

The handset 310 is equipped with a tag that provides a unique identifier that can be wirelessly communicated to the WHUB 320. A preferred tag is a Near Field Communication (NFC) tag 312. NFC provides short-range wireless connectivity that uses magnetic field induction to enable communication between the devices. It has a short range of a few centimeters, which is believed to be advantageous for applications of this aspect of the present invention. Although NFC is preferred, RFID or other substitutes may also be provided. The handset 310 also includes a WPAN transceiver 314, which allows additional communication channel between the handset and the WHUB 320.

The wireless WHUB 320 is similarly equipped with an NFC reader 322, a WPAN transceiver 324 and a network adaptor 326. The NFC technology accommodates secure and automatic authentication and data exchange between the NFC tag and NFC reader. According to this aspect of the present invention, the NFC is uniquely associated with other information that allows the appropriate action (payment, alert, etc.) to take place. For example, where the system is being used to accommodate mobile payment, the RFID tag is associated with the user's bank account. Further, once the device is authenticated through the unique identifier, a second secure communication channel with more capabilities is established between the handset 310 and WHUB 320. This allows the action request and related communications to be reliably transmitted between the two devices.

Accordingly, once the NFC based authentication is accomplished, a secure wireless connection between the handset

10

310 and WHUB 320 is established. This communication can implement the WPAN transceiver, which has a higher data rate and longer operational range compared to NFC. The secure communication allows the exchange of additional information related to the action, such as price and credit card information for a purchase request and corresponding payment scenario, to be sent between the handset 310 and the WHUB 320. The secure communication can be implemented by hardware (e.g., a dedicated hardware chipset) and software (e.g., data encryption algorithm).

The WHUB 320 can also exchange data with other WPAN devices 350. It may be useful for the WHUB 320 to communicate with these devices 340 to exchange information related to the action. For example, the WHUB 320 may collect water usage information from a water meter equipped with the WPAN device 340 functionality. This data may be stored locally by the WHUB 320, or may be transmitted to the appropriate server 330 through the network connection 350.

20 The data does not necessarily need to be collected by the WHUB 320 concurrently with the user-requested action. For example, the acquisition and transmission of water usage information may occur periodically, and separate from the user's request to make a corresponding payment.

25 It is also noted that the WHUB 320 may optionally be configured with a wireless communication capability such as that provided in a cellular phone. The WHUB 320 is thus configurable to operate with a system that delivers locally applicable Internet content as described above in connection

30 with FIGS. 1 and 2.

FIG. 4 further illustrates and provides an example of a payment process 400 in accordance with this aspect of the present invention. The process 400 initiates with an authentication 402 process that accommodates recognition and 35 identification of the handset by the wireless WHUB via the NFC tag.

30 The communication through the separate secure communication channel (e.g., WPAN) is then established. The WPAN functionality is used to communicate between the handset and the WHUB, so that content related to a requested action may be securely exchanged. In this example, the requested action is a purchase request 404.

40 It should be noted that the action may or may not immediately follow authentication 402. For example, the cellular phone may be configured to include browsing capability, which allows that interface of the cellular phone to be used to review items prior to making a purchase request.

45 Various purchase types may be made with the purchase request. Examples may include a physical item that is separately shipped to an address, a download that is made available immediately, possibly to the cellular phone, a service, etc.

50 Internet content may be accessed by the cellular phone in association with an action request. One example of providing content to the cellular phone may be the locally applicable Internet content as described above in connection with FIGS. 1-2. Also, the cellular phone may access Internet content through channels other than through the WHUB.

55 It is also noted that a purchase request is just one form of an action that may be carried out. Actions include but are not limited to bill payment, populating an account with funds, online shopping transactions, and others.

60 The process of authentication may be based upon a Tag ID and password. The Tag ID and password are sent 406 to the authentication server, which then returns a notification 408 confirming authentication. Preferably, this authentication indicates whether the individual is who he or she claims to be,

US 8,135,398 B2

11

but does not address the access rights of the individual. The authentication server may reside within or outside the WHUB.

As necessary, additional information may also be required in association with a requested action. For example, account identification information or passwords to access an online account may be required by an external server. In these circumstances, the external server sends a request to the WHUB for the information. The WHUB may store such information and respond to such a request. Alternatively, the WHUB may further exchange information with the user (through the handset), in order to obtain the additional information requested by the external server.

In connection with the purchase request 404, a payment request 410 is made between the WHUB and external server through the network connection. The payment request 410 allows the user to complete the transaction related to the purchase request 404. To accommodate a satisfactory completion of the payment request, the server corresponds with a payment gateway, and a resolution 412 indicating whether the payment request succeeds or fails follows.

Upon an indication of a successful payment request, the WHUB receives 414 a receipt or confirmation number from the external server relating to the requested action, and passes 416 that and/or related information to the handset confirming completion of the action. This may be a receipt, confirmation numbers, coupon codes, or the like.

According to still another aspect, the present invention provides for wireless management of tasks and corresponding alerts. One such task is diaper management, which is described in detail as follows.

This aspect of the present invention accommodates task management based upon wireless delivery of alerts to overcome the problem of estimating when the task requires completion. These alert based tasks include but are not limited to diaper management. For example, home security monitoring may also be accommodated.

FIG. 5 illustrates an example of a diaper management system 500 according to the present invention. The diaper management system 500 includes a diaper condition sensing module 510 and a central receiver/controller (CRC) 520. The CRC 520 operates on a conventional processing platform, and is configured to communicate wirelessly with the diaper condition sensing module 510. The CRC 520 also includes a network interface. The wireless and/or network interface accommodate the transmission of appropriate alerts to caregivers.

The diaper condition sensing module 510 includes a sensor 512 and a transmitter 514. The sensor 512 is configured to monitor one or more of the following conditions, whose results indicate whether the diaper is wet or not:

1. The weight of the diaper—urine or feces make the diaper heavier than a dry and clean diaper;
2. Electric conduction of urine;
3. Chemical properties of urine—volatilized air including volatile acid or ammonia, pH, starch enzymes, ketone bodies, and/or urobilinogen may all be detected and analyzed to determine the presence of urine;
4. Feces: the solid waste material; the bilirubin, or sterobilinogens in the feces; the specific food decomposed material including starch, fat, plant fiber, muscle fiber and so on; and/or
5. Any other elements, features, characteristics, and reflections of the unwanted on babies' diapers.

The sensor 512 triggers the transmitter 514 to establish a wireless communication channel between itself and the CRC 520. A signal is sent by the transmitter 514 to inform the CRC

12

520 that the diaper is wet. This wireless communication channel preferably uses wireless technologies such as UWB, Bluetooth, RFID, Spread Spectrum, or other conventional wireless communication technologies.

5 Each sensor 512 preferably has a unique ID. Multiple access mechanisms, such as TDMA, CDMA, FDMA, or other conventional approaches, may also be applied to allow the central receiver to communicate with multiple sensors at the same resource. It is believed that Zigbee/Bluetooth may be useful for many applications in light of the competing demands of working range, data rate and cost.

10 After the CRC 520 receives the signal, the receiver triggers sound, light, text and/or other indications of the status of the diaper. These indications may be variously displayed, broadcasted, reflected, etc. through speakers, telephones, pagers, beepers, computers, and so on to inform the caregiver(s) so that they can remedy the situation.

15 The diaper condition sensing module 510 may be variously provided. One example connects to the diaper using a probe that measures for desired criteria as described above and as shown in FIG. 5.

20 Another example provides the diaper condition sensing module 510 within the diaper. In this example, the sensor 512 also includes interfaces (probes) for measuring the desired criteria, within the confines of the diaper. The transmitter 514 may use various communication techniques as described above. For an RFID embodiment, the function may be provided by causing the circuit loop of the RFID tag to transition from open to close when the diaper condition (e.g., wet) is detected by the sensor, which automatically causes the ID Tag to be sensed by the tag reader of the CRC.

25 Still further, in this example the diaper condition sensing module 510 may be placed within a diaper and reused. Diapers may be configured with pouches or the like to allow the placement of the diaper condition sensing module 510. In another alternative, the diaper condition sensing module 510 is manufactured and sold as an integrated part of each diaper, so that caregivers do not have to be concerned about the placement of the module 510 each time a diaper is changed.

30 In addition to assisting a caregiver with regard to an individual child's diaper, a diaper management system may be configured to manage the diapers for groups of children, such as a pre-school class or a day care facility where many children may potentially wear diapers. An example of such a system 600 is shown in FIG. 6. The CRC 620 is configured to distinguish children in need of new diapers from those that are not and respectively sends messages to appropriate caregivers. To carry out this functionality, the CRC 620 is equipped with a database that associates the unique identifier corresponding to each diaper condition sensing module 610a-g to at least one contact party. Alternative communication pathways (phone, e-mail, etc.), multiple contacts (caregiver#1, caregiver#2), and various other information may be associated to a given diaper condition sensing module 610a-i in the database.

35 In addition to providing a status alert about the condition of the diaper, the CRC 620 also determines the location of the diaper by using wireless location techniques, including but not limited to Angle of Arrival, Time of Arrival, and Received Signal Strength Indication. This allows the option of also giving the designated caregiver information about the location of the child having the soiled diaper.

40 FIG. 7 is a flow diagram illustrating a process 700 for sending a caregiver alert according to a diaper condition in accordance with the present invention. The process 700 commences with the DCSM sensor monitoring 702 the diaper condition. When the diaper condition changes, such as when

US 8,135,398 B2

13

it is wet, the DCSM sensor detects the updated condition of the diaper. When this occurs, the DCSM transmitter sends 704 the diaper condition update to the CRC. The CRC receives 706 the update and corresponding indications. Many conditions may be updated and the DCSM and CRC are configured to communicate them accordingly. The CRC, once provided with the update, proceeds to estimate the location of the (e.g., wet) diaper. The DCSM sends an ID corresponding to the update, which identifies the diaper/child. The CRC queries its database and thus matches 708 the ID corresponding to the update to tailor caregiver alert(s). These alerts are then sent 710 to the caregiver(s) accordingly.

In the situation where there are multiple children/diapers being monitored, the CRC provided alert may be to a PC having a display screen with a map of the room(s) and the estimated location of the wet diaper. Other CRC provided alerts may merely notify additional caregiver(s) as to the status of the diaper, without the location, so that the additional caregiver(s) may be apprised of the status. The CRC may also poll the DCSM after a given period of time to ensure that the diaper condition has been updated. The CRC may be configured with configuration settings that allow a caregiver to specify when and how they should be updated. For example, if one caregiver is a baby sitter watching the child while the parents are out, the parent may configure the CRC not to send an alert to them when the diaper is first detected as being wet, but to wait until a certain period of time elapses. By contrast, the baby-sitter alert may be provided immediately. If the certain period of time passes and the diaper remains wet, the CRC can then notify the parent about the diaper condition, and the parent will realize that the diaper has not been changed.

FIG. 8 is a block and event diagram illustrating an example of a system 800 that implements several aspects of the invention described above. The system 800 includes UE 802, WHUB 804, Authorization Server 806, Base Station(s) 808, LCN Server(s) 810 and DCSM 812, which respectively provide the functionality described above for the components having the same names.

Local Merchant Server(s) 814 are also illustrated. As described in connection with the provision of locally applicable Internet content, merchants are apprised as to the local applicability of content, such as may be determined by frequency of access by users at a particular location corresponding to given base station(s). The WHUB 804, in addition to being configured to facilitate secure receipt and performance of an action such as a purchase request and corresponding payment request, includes the CRC functionality that allows a response to diaper condition update as provided by the DCSM 812 (the diaper being just one example of an item for which updates may be provided).

With the system 800 configured as such, the delivery of locally applicable Internet content may be provided in conjunction with the diaper update. Also, a local merchant (and corresponding server) 814 that sells diapers is able to present a coupon or other incentive to the user in conjunction with the determination that a diaper is wet by the DCSM 812. Moreover, in addition to having the capability of reminding the caregiver about this, the WHUB 804 may keep a database of household requirements and inventories. For example, the WHUB 804 may monitor the number of diapers detected as being used. When the amount of used diapers is close to the amount known to have been purchased previously, an additional alert may be presented to the user so that they are aware that they need diapers and they can get the discount if they buy brand X based upon the information provided by the local merchant.

14

The process for providing such functionality may be as follows. Based upon historical activity relating to access of locally applicable Internet content, as well as whatever merchant participation is desired in conjunction with the system 800, the local merchant's information is cached 852 at the relevant LCN Server(s). A wet diaper is detected 854 by the DCSM 812 and this information is transmitted to the WHUB 804. The WHUB 804, managing the diaper inventory for the household, determines that the inventory of diapers is low, and thus sends 856 a purchase alert through the Base Station 808 requesting information related to the current need. In response to this, the LCN Server(s) 810 determine that the local merchant information is relevant to the current need, and thus retrieve 858 and send 860 the cached local merchant information to the WHUB 804.

In conjunction with the above exchange of information, alerts of both the diaper condition and the low diaper inventory may be provided and retained for user review. When the user is ready to make a purchase, this may be accommodated via the WHUB 804. This purchase request may be made by directly interfacing with the WHUB 804, or by using the UE 802 in the fashion described above. The latter option is shown. There, the UE 802 sends 862 its Tag ID and purchase request to the WHUB 804. This, of course, may follow some browsing activity prior to the purchase request, so as to review the possible purchase options. The authentication may be as described above, based upon a Tag ID and password. The Tag ID and password are sent 864 to the authentication server, which returns a notification 868 confirming authentication.

Once the authorization is obtained, payment is sent 868 to the Local Merchant server 814 to complete the transaction, and the receipt, confirmation and other information may be fed back to the WHUB 804 regarding the same. For physical product like diapers, the WHUB will have provided (or the Local Merchant may already have) the shipping address. Additionally, if the Local Merchant is a provider of several items (such as a supermarket), then items may be accumulated prior to completing a purchase and/or making a shipment and/or making the products available for pick up by the user. The WHUB is preferably configured with a shopping list that allows organization of periodic cumulative purchases to accommodate this functionality.

FIG. 9 is a schematic diagram illustrating an example of a system 900 with mobile terminal signal conversion.

Mobile terminal signal conversion accommodates displaying the high rate data flow multimedia information available in a wireless communication environment in an external device, which allows true realization and enjoyment of the benefits of the multimedia content.

In one example, the multimedia information is provided to a wireless mobile terminal using so-called next generation cellular technology (i.e., 3G and 4G), which can be employed in transmitting multimedia information (e.g., rich graphics, real-time audio/video). Because of the relatively small screen size and low quality ear phones, for many applications the mobile terminal cannot adequately reproduce the high quality multimedia information that can be communicated using next generation technology with adequate clarity and satisfaction. Mobile terminal signal conversion makes usage of a separate multimedia display terminal including but not limited to a monitor, television set, projector, or LCD display. These displays typically have video and audio reproduction capabilities that are superior to those found on mobile terminals. They also use a power supply that is separate from the mobile terminal.

Still referring to the system 900 illustrated in FIG. 9, multimedia information may be provided by any number of ser-

US 8,135,398 B2

15

vice providers 902a-b and delivered through a network 904 to a base station 906 to ultimately accommodate transmission of the multimedia information, among other things, to a cellular phone 908. This system 900 is provided by way of example, and it should be understood that any conventional or to-be-developed technology for delivering voice and/or data to mobile terminals may be provided. These wireless communication networks include but are not limited to a cellular communications network or a wireless local area network.

Also illustrated is a typical external display system 914. This may also be variously provided and may be digital or analog. Examples of digital Systems include HDTV, LCD and plasma. Examples of analog Systems include television sets that implement standards such as NTSC, PAL, SECAM, and analog computer monitors (SVGA, VGA). The external display system 914 does not have the size constraints of the display screen on the cellular phone 908 and is preferably powered independently.

In the illustrated embodiment, a mobile terminal signal conversion module (MTSCM) 912 resides within a separate housing 910, outside the cellular phone 908.

The functionality of the MTSCM 912 is now further described with concurrent reference to FIG. 9 and the flow diagram of FIG. 12.

The MTSCM 912 processes signals to accommodate reproduction by an external device. Specifically, a multimedia signal is transmitted to the cellular phone 908 through the wireless communications network as previously described (step 1202). The multimedia signal may include a video signal intended for reproduction by the cellular phone 908, using the cellular phone display screen. For ease of description, processing of a video signal is described, although it should be understood that any multimedia signal or component thereof may be converted in accordance with the present invention.

The cellular phone 908 is connected to the MTSCM 910. This may be accommodated by a cable connection that interfaces the cellular phone 908 to the MTSCM 912 housing 910. Through this connection, the MTSCM 912 receives the video signal from the cellular phone 908 (step 1204). The video signal as received may be configured to accommodate a video display on the screen provided by the cellular phone 908. The cable connection is an example of a wired connection interfacing the cellular phone 908 to the MTSCM 912. An alternative wired connection is a seat that directly interfaces the two without a cable. A wireless connection may also be provided, although it may currently be less practical to provide than the wired connection because of the potential for high throughput rate requirements. The wireless connection may also implement any conventional known technology including but not limited to a Bluetooth connection.

The MTSCM 912 processes the video signal to provide a converted video signal that has a display format and/or signal power level appropriate for an external display terminal 914 that is separate from the cellular phone 908 (step 1206). The display format and/or signal power level of the external display terminal 914 may be different from that of the cellular phone 908 but there may also be embodiments where the format is the same. Even if the formats are the same, conversion of the signals to accommodate display on the external display terminal 914 would still be implemented to adjust the power level for driving the external display, and possibly to minimize throughput requirements. This signal conversion is described further with reference to FIGS. 10 and 11, below.

Still referring to FIGS. 9 and 13, following signal conversion, the MTSCM 912 provides the converted video signal to the external display terminal 914 to accommodate the corre-

16

sponding video display on a screen provided by the external display terminal 914 (step 1208). This may be accommodated through a connection between the MTSCM 912 housing 910 and the external display terminal 914 as shown.

As used herein, mobile terminal refers to typically handheld mobile devices such as cellular phones and personal digital assistants. Although these devices include an execution platform as well as input and display capabilities, such devices are distinguished from personal computers, such as desktop or laptop computers, which are not designed for convenient handheld usage.

FIG. 10 is a block diagram illustrating an example of an MTSCM 1000 in accordance with the present invention. The MTSCM 1000 may be provided as software, firmware, hardware, or any combination thereof.

Where the MTSCM 1000 is provided as software, it operates in the context of an execution platform. That is, the MTSCM 1000 includes instructions that are stored in memory for execution by a processor. Any conventional or to-be-developed execution platform may be used. The processor, memory, and related elements such as a power supply are well known and need not be described herein to convey an understanding of the invention. Additionally, FIG. 10 illustrates one modular breakdown for the components of the MTSCM 1000. It should be understood that the described functionality may alternatively be provided by an MTSCM having fewer, greater, or differently named modules from those illustrated in the figure.

Additionally, although modules as shown to reside in a common location, it is noted that the functionality may reside in separate components of a system that includes a mobile terminal, an external monitor, and (optionally) an intermediate device housing the MTSCM and interfacing the mobile terminal and external monitor. In other words, the overall functionality of the MTSCM may be separated such that portions of the overall functionality are respectively provided by the mobile terminal, separate intermediate housing, and/or the external display device.

The MTSCM 1000 may also be provided in the form of a chipset, configured for inclusion in a mobile terminal, dedicated separate signal conversion device, or external display terminal, and to provide the described mobile terminal signal conversion functionality.

The MTSCM 1000 includes a mobile terminal interface module 1002, a signal conversion module 1004, and an external device interface module 1006.

The mobile terminal interface module 1002 accommodates receiving the multimedia signal from the mobile terminal. A conventional physical interface provides a connection between the MTSCM 1000 and the mobile terminal through which the signals flow to the MTSCM 1000. The mobile terminal interface module 1002 recognizes the multimedia signal and stores the signal for processing by the remaining modules. Buffering and the like may be implemented to accommodate storage and signal processing, as described further below.

The signal conversion module 1004 is in communication with the mobile terminal interface module 1002 and thus accesses the received multimedia signal. The signal conversion module 1004 recognizes the multimedia signal format, and processes the multimedia signal to provide a converted signal. The converted signal may have a format and a signal power level that differs from the one used by the mobile terminal, as appropriate for one or more types of external devices to which the MTSCM 1000 is connected. Various

US 8,135,398 B2

17

examples of the type of devices to which the MTSCM 1000 may be connected are illustrated and described in connection with FIG. 11, below.

The external device interface 1006 is in communication with the signal conversion module 1004 and thus accesses the converted signal. The external device interface 1006 also allows connection to the external (e.g., display) device. The external device interface 1006 may provide both the feeding of the converted signal to the external device, and driving the external device. Alternatively, the external device interface 1006 may merely feed the converted signal to the external device, with the external device including internal elements for driving its signal reproduction (e.g., display) facilities.

FIG. 11 is a block diagram illustrating another example of the MTSCM 1100. The MTSCM 1100 includes additional detail regarding the signal conversion aspect, and illustrates examples of differing types of external devices to which the MTSCM 1100 may provide converted signals. The illustration and corresponding description are provided by way of example. Although numerous connections are illustrated, it should be understood that the present invention may be practiced in the context of providing as few as one, and as many as all of the listed connections. It should also be understood that there may be additional examples that are not listed herein, but which are encompassed by the teachings described herein.

The MTSCM 1100 includes an interface/buffer module 1102 that is analogous to the previously described mobile terminal interface module. The buffer and interfacing are configured to accommodate signal processing by the remaining elements in support of the requirements and expectations of users of the multimedia signal output (e.g., adequate buffering and processing rate to provide real time audio/video). The mobile terminal video compression format may of course vary, but currently the most likely format is MPEG-1 or MPEG-2. Buffering and throughput rate may also be provided as desired by the designer. Currently, it is believed that 200 Mb is an adequate buffer size, although buffers of 500 Mb or more may of course be provided. Additionally, a throughput rate of approximately 10 Gb/s will be adequate for many current Systems, but may be increased as demands and technology evolve.

The Video Compress Decoder 1104a receives the multimedia signal. The multimedia signal is typically provided in a compressed format to accommodate increased signal transfer rates. An example of a compression scheme is that provided by one of the MPEG standards (e.g., MPEG-1, MPEG-2, MPEG-4). The Video Compress Decoder 1104a is configured to include the appropriate compression/decompression (CODEC) module to accommodate decompression of the received multimedia signal. For example, where the compression scheme is MPEG, the Video Compress Decoder 1104a includes an MPEG CODEC to accommodate processing of such multimedia signals.

As an alternative to provision of the Video Compress Decoder 1104a in the MTSCM 1100, the functionality may be provided within the cellular phone or other mobile terminal. However, this may be less practical because of the high bandwidth that would be required between the cellular phone and the MTSCM 1100 to deliver the decompressed signal, and the corresponding likelihood of a larger buffer requirement for the MTSCM 1100.

The Video Compress Decoder 1104a outputs a decompressed digital multimedia signal that is passed to the Digital/Analog Video Encoder (DAVE) 1104b and/or the Digital/Digital Video Encoder (DDVE) 1104c. The DAVE 1104b is configured to prepare signals for analog external display ter-

18

minals 1120, and the DDVE 1104c is configured to prepare signals for digital external display terminals 1122. The DAVE 1104b and DDVE 1104c respectively receive the decompressed multimedia signal and convert the signals to the format(s) and signal power level(s) required for the terminals to which they interface.

Examples of formats used by analog display terminals 1120 include S-video, RGBHV, RGBS, and EIA770.3 as illustrated. Similarly, the DDVE 1104c provides output using standards such as DVI, DVI-D, HDMI, and IEEE1394. The signals respectively provided by the DAVE 1104b and DDVE 1104c are provided to the terminals through conventional interfaces 1106a-b. The DAVE 1104b functionality may be embodied as a video card that is configured accordingly.

Examples of video cards that may be configured to provide the described functionality include but are not limited to the Diamond Stealth S60, ASUS V9400-X, or RADEON 7000.

Ultimately, the signals are used to provide a display on the external display, as required according to the particular type of display. For example, the video data stream may be a digital RGB signal which represents the intensity of the red, green and blue light respectively at different position. This signal is converted to analog by a D/A converter. This converted analog signal is quantified to the voltage and format required by the standard, such as the input of cathode-ray-tube (CRT) monitor. This standard video signal will drive a set of electron guns, which produce a controlled stream of electrons to display of red, green and blue light respectively on a CRT screen. This is but one example and the present invention is not limited to a particular technology (e.g., CRT) for the external display.

As described, in one embodiment the MTSCM may be independently housed separately from both the mobile terminal and external display terminal, with respective connections to the other devices to provide a system configuration that includes the three pieces of hardware (mobile terminal, conversion box, external display terminal). This configuration provides the flexibility of allowing any standard mobile terminal and/or display to be potentially interface with the MTSCM without imposing constraints on the mobile terminal or external display terminal manufacturers. A possible drawback to this configuration is that additional hardware is introduced into the system.

In lieu of the three component system, the MTSCM may be located in either the mobile terminal or the external display. FIG. 13 is a schematic diagram illustrates an example of a system 1300 in which the MTSCM mobile terminal signal conversion may reside within the mobile terminal 1308. The components and functionality of the service providers 1302a,b network 1304 and base station 1306 for delivering multimedia signals to the mobile terminal 1308 is the same as for the analogous elements of FIG. 9 and need not be re-described. Similarly, the external display terminal 1314 may be any of the various types named above.

The MTSCM 1312 provides the same functionality described above. However, in contrast to residence in a separate housing, the MTSCM 1312 is a component of the mobile terminal 1308. A potential advantage of this system 1300 is that, again, any standard equipment can serve as an external display terminal 1314, without a constraint on the display manufacturer. Additionally, only a simple wired or wireless interface is required to connect the external display with the mobile terminal 1308. This means, for example, that the user will not be required to carry a bulky conversion module in addition to their cellular phone.

A potential drawback to this system 1300 is that the execution platform of the mobile terminal 1308 may be designed to

US 8,135,398 B2

19

accommodate only traditional functionality, so for some Systems it may be challenging to add the MTSCM functionality to the existing platform. Additionally, the MTSCM will consume power that may unduly exhaust the limited power supply offered by the mobile terminal 1308 battery. It is useful for this embodiment to provide power to the mobile terminal 1308 through the cable connection to the external display terminal 1314, but again this may require modification to the mobile terminal 1308 as the existing charger interface may be insufficient.

FIG. 14 is a schematic diagram illustrating another example of a system 1400, in which the MTSCM 1412 resides within the external display terminal 1414. As with FIG. 13, the components and functionality of the service providers 1402a,b network 1404 and base station 1406 for delivering multimedia signals to the mobile terminal 1408 is the same as for the analogous elements of FIG. 9 and need not be re-described.

Here, the mobile terminal 1408 need only be connected directly to the external display terminal 1414. However, in lieu of having the MTSCM 1412 functionality reside within the mobile terminal 1408, it is part of the external display terminal 1414. The power supply and execution platform issues associated with placing the MTSCM 1414 in the mobile terminal are resolved with this system 1400, and any mobile terminal 1408 can potentially be connected to any MTSCM-ready external display without requiring modification, other than provision of an output interface. A potential drawback of this configuration is that it adds a component to the standard external display terminal, and corresponding costs.

FIG. 15 is a schematic diagram illustrating examples of mobile terminal signal conversion applications 1500 in accordance with the present invention. These applications 1500 are provided by way of example, to give the reader an understanding of the potential contexts in which embodiments of the present invention may operate. The present invention is not limited to the disclosed applications, nor are all potential applications required for any given embodiment.

The basic architecture for provision of the wireless communications signal and corresponding multimedia signal is as described above for the service providers 1502a-b, network 1504, base station 1506 and mobile terminal 1508. The MTSCM 1510 may be separate or reside in the mobile terminal 1508 or display terminal 1512. Examples of applications 1514 where a larger screen and potentially superior audio may be enjoyed include video conference, HDTV, games, GPS, and video on demand. Additionally, embodiments of the present invention will accommodate enjoyment of full multimedia capability in locations 716 including vehicles, airports, hotels and remote resorts. Thus, for example, the present invention accommodates usage inside a vehicle, a plane or any type of transportation, enabling the passenger to browse the Internet, watch TV, play games, participate in a video conference or call, and work on all sorts of software with full functionality.

FIG. 16 is a schematic diagram illustrating a control system for multimedia communications between different user terminals.

According to one aspect of this embodiment, a converting server that is variously positioned in network environments provides a routing function and a connecting function, and functions bi-directionally. Accordingly, this aspect provides for the transmission and receipt of content and converts such content in both directions depending upon the connected devices and corresponding protocols used by such devices.

20

According to another aspect of this embodiment, cellular television functionality is provided. Here, a television in form and functionality also includes cellular communication features as well as the above-described conversion functionalities. Preferably, one or more "channels" corresponding to the cellular application are provided in the cellular television so that the content received in this fashion may be accessed and viewed by a user in a fashion similar to that used for accessing traditional television channels.

10 According to still another aspect, one or more embodiments of the invention provide efficient integration for Internet, wireless networks, cable, DSL, satellite, and TV communications to enable communications among potentially different user terminals. The user terminals include home and 15 office appliances (such as TV, computer) and wireless terminals (such as mobile phone, PDA). In a system configured according to this aspect, a Management Center (MC) System receives, selects, converts, compresses, decompresses, and routes data to the user terminals. Various examples are presented and will be apparent to the ordinarily skilled artisan once instructed according to the teachings of this aspect. By way of example, signals such as those from a fire alarm or theft sensor are sent through the MC System to a user's cell phone and/or 911 Center. Some processing functions may be 25 performed by the MC System in combination with a user terminal and other MC Systems. In another example, a user's phone call (wireless or wired) is routed to a telephone, mobile terminal, computer, and/or TV as designated by the user.

The MC System functionality includes receipt, conversion 30 and transmission of content in two directions. It also includes facilities for mapping and routing content to various connected devices and data storage for storing content that is served locally or to remote devices.

Receiving, converting and transmitting multimedia content 35 may be performed in two directions using the MC System. For example, this may include receiving and transmitting signals from cellular networks, Internet, PSTN, other Management Centers, as well as receiving and transmitting signals from user terminals including televisions, monitors, 40 diaper monitoring, a video camera, fire alarm, theft sensor, etc.

With regard to conversion, the MC System includes a converter module with routines for selecting, extracting, compressing, decompressing, adjusting data, and converting the 45 data format and/or power lever and/or data package size/format.

The MC System also includes a mapping table and a routing module. The mapping table is described further below. It matches phone numbers, cable ports, DSL ports, IP 50 addresses, etc. The routing module is for routing data to destinations through designated channels. The routing module accommodates routing the received data that is inbound from a variety of sources including but not limited to cable, broadcast television and Internet. It also accommodates routing to a variety of interfaces found on receiving terminals, including but not limited to RS232, USB2.0, and video cable port. The routing module receives the relevant information concerning routing from the results of looking up the same in the mapping table, and carries out the routing accordingly.

Finally, the MC System includes data storage such as a hard disk. This allows the MC System to store content to assist faster and more efficient data receiving and transmission to user terminals. The MC System may also conveniently retain converted content (e.g., compressed, coded, decrypted, 60 decompressed) for subsequent additional access. This converted content may be provided internally or transmitted externally from the MC System.

US 8,135,398 B2

21

It is also noted that the MC System may include software and/or hardware for filtering and treating viruses, such as viruses that involve the cellular network and corresponding cellular communications. For example, the MC System may periodically or persistently check for virus signatures when content is being transmitted or received by the MC System. Virus screening processes may thus be applied to multimedia content items in conjunction with their conversion, and at the same location (the domain of the MC System). This may be useful because virus screening may be applied to multimedia content before and/or after it is converted. Treatment may include blocking or quarantining viruses that are detected, deleting virus data or files, and communicating the possible presence of attacks to other MC Systems or external systems.

When a communication is inbound to the MC System, it may include a data package that identifies the destination device. This may be in the form of a unique device identifier that is associated with each device managed by the MC System. The mapping table is queried for the presence of the unique identifier. Once this is successfully performed, corresponding information regarding the processing of the communication may be automatically gathered from the mapping table.

Additionally, or alternatively, the MC System (and/or CHS) can obtain formatting, addressing, and other information by referencing portions of the received data package according to a predefined protocol. For example, information within the received data package may indicate the format (e.g., TCP package in Internet) for transmission and the format (e.g., data package defined by WCDMA standard in 3G) for receiving, as well as the destination address corresponding to the converted data format. The overhead information within the received data package can inform the MC/CHS regarding the next transmission protocol and matched format. That is, the data package received by the MC/CHS includes some defined extra data besides the desired content data. This information informs the MC/CHS regarding the inbound data format transmission protocol, and also the outbound data format and the transmission protocol corresponding to the data format.

For example, if the data package contains the identifier DI, it is determined that the communication is intended for the main television in the household. In a simple example, all communications to a given device may be required according to the same format and same address. For example, a regular video output may be directly connected via cable between a video output from the MC System to the video input of the main television (e.g., by coaxial cable, component cables, HDMI cable). With regard to this example, the MC System includes a regular output for making the connection to the television.

There may also be network-based connections, such as to a personal computer (or home LAN router) or directly to a television equipped with a network interface card and related functionality. In these instances the address information (and corresponding entries in the mapping table) would include the network address of the particular device. The MC System is equipped with its own network interface card and corresponding output to engage in these communications. These and other communications such as to a cellular phone via either the use of the cell phone number or a direct local wireless communication may be made, again as indicated in the mapping table.

There may also be situations where multiple different processes and corresponding conversion and addressing need to be applied for a given device. For example, a television set may be connected to both a network connection and the video

22

output of the MC System. As another example, a cellular phone may have alternative communication capabilities as noted. In these circumstances, the mapping table may also include multiple different entries designating the address, signal format, etc.

Thus, the information in the mapping table may also be correlated to several processing category codes for a given device. For example, processing category code #1 for the television set may indicate that the inbound communication should be addressed, converted (if applicable) and routed to the television through the video output. This might be merely feeding conventional television signals to the television. On the other hand, processing category code #2 for the television may indicate that the inbound communication should be addressed, converted and routed through the network connection. Still further, some special content may require additional or different processing (e.g., conversion, decryption, etc.) as compared to other content. Additional processing category codes may allow such content to be processed appropriately.

10 The processing category code may (like the device identifier) be a number that is included in the data package.

The data package may also be variously provided to the MC System. In one embodiment, the data package may be contained in a header area in packet data sent to the MC System by the source. Still further, at times the data package may itself contain information used in converting and/or addressing the appropriate device. For example, the data package itself may contain the network address of the destination device in lieu of looking for the same in the mapping table.

15 As another example, all or part of key information for decrypting content may also be provided in the data package. As still another example, the data package may contain a flag to track an indication as to whether a virus screening process has completed successfully.

20 Devices that are intended to work with the MC System may also be equipped with software and/or hardware that allows them to insert and deliver the appropriate information in communications with the MC System. For example, a cellular phone may be equipped with software that provides the appropriately configured data package in initiating communications with the MC System that are directed to destination devices.

25 The MC System variously processes data depending upon corresponding devices and purposes for the data. For example, the data received from cellular networks are selected and then converted to be displayed on home or office appliances with different types of display screens. Similarly, some content can be displayed more properly by mobile phone displays.

30 In addition, some data are also compressed and re-organized at the MC System so that they have certain data package sizes and formats for matching the requirements of the relevant transmission networks. For example, the signals sent from a wet diaper, fire alarm, and/or theft sensor may be transmitted to a user's cell phone or 911 Center. This information may be compressed before transmission over the wireless network, which allows increased efficiency when using the wireless communication channel. Additionally, security and encryption protocols (e.g., SSL) and error prevention protocols and coding schemes (e.g., Huffman, Solomon, or Turbo LDPC coding) may be applied to ensure that the information that is transmitted remains secure and without error.

35 By way of example, this aspect of the invention may be applied to home appliances. The home appliances (e.g., TV set, PC, Handset, Printer, PALM, camera, Headset, game controller, refrigerator, etc.) may also function through a cen-

US 8,135,398 B2

23

tralized HUB system (CHS). Such a HUB system is previously described in detail above. The CHS communicates with the MC System and/or Internet and/or other networks. The CHS can also be built into a cable modem, TV set top box, or other device. The signals, for example, from a wet diaper, fire alarm, or theft sensor can also be sent from the CHS. Finally, it is noted that the CHS may perform the functions described for the MC System.

The commonly practiced wireless connection centralized by wireless access point is based on WLAN technology, which is IP-oriented technology. Since the IP addresses may exhaust over time, each consumer electronics item such as headset, game controller, etc. configured to have an IP address is costly and fails to serve the user's needs well. One or more embodiments of the present invention offer two aspects in this regard. First, an intelligent management system centered by traditional connection equipment, such as TV set top box, cable modem, DSL modem or the like unites, manages, and optimizes the consumer electronics' functions. Also provided is a non-IP based wireless connection among these consumer electronics devices.

As shown in FIG. 16, the CHS communicates with the Internet through ADSL or cable and cellular base stations through wireless connection. The consumer electronics items communicate with the CHS through wireless channels such as Bluetooth, UWB, NFC or wire line connection. CHS is the center of this wireless communication system.

A handset (e.g., cellular phone) can receive Internet data through CHS and/or MS instead of communicating with a cellular base station. This communication channel is more reliable, less costly, and offers improved bandwidth compared to conventional connections between base station and the cellular phone.

There may be a corresponding connection between the CHS and the cellular network. This may implement a traditional wireless connection between the CHS and a cellular base station, with the communications implementing conventional wireless communications protocols. Another possibility is a leased line or wireless line connecting the CHS to the core cellular network. The CHS preferably includes a WiFi router function as well as the ability to route addresses between IP and cellular telephone number. It also is able to report to the cellular network with regard to the location of a particular user, so that information designated for that particular user may be directed to the CHS accordingly (e.g., calls, content ordered by particular user via cellular phone, etc.). It also may include any necessary conversion functions. In addition to reporting the location of a user to the cellular network, the MC System (or CHS) may also report roaming information to other MC Systems (or CHS). This allows subsequent communications between users without involving the cellular network. That is, a first user may be located in the covered area for a first MC System, and a second user may be located in the covered area of a second MC System. While this circumstance remains, communications between the first and second users via their mobile terminals may involve the wireless connections from the MC Systems (as well as the connection between MC Systems, which may, for example, be an IP connection).

In addition, the information sent to the cellular phone can be delivered to a TV for a better display in accordance with another aspect of the present invention. Furthermore, the communication between CHS and an oven with sensors and corresponding conditions can be variously triggered, such as through the detection of boiling water or the temperature of the food in an oven. A signal to arouse the attention of whom-

24

ever is cooking the food or boiling water is transmitted to the TV, acoustic system, cellular phone, computer, beeper, mobile terminal, PDA, etc.

Another example of the application of the invention is that a wireless transceiver can be installed in a child's diaper. When the diaper is wet, the communication between diaper and CHS is triggered. Corresponding signals will be delivered to TV, cellular, day care center, etc.

Internet content is one source of data transmitted to users' terminals through the MC System. One aspect of this invention is the structured location of the Content Server and/or MC Systems, as shown in the FIG. 16.

As described in further detail above, a cache of locally applicable content caches particular Internet content that is determined to be locally applicable based upon the monitoring of the Internet content accessed by users from the particular location. This content may be content that has also been converted as described herein. The particular Internet content is preferably cached at a local content storage placed within local Management Center. Alternatively, the particular Internet content is cached at Content Server which is placed logically proximate to two or more Management Centers sharing the Internet content. Logical proximity may be variously carried out, such as through physical proximity or by provision of dedicated bandwidth and resources. Requests for Internet content for the particular location may thus be served from the cache, to optimize delivery, where the cache contains the requested content.

In addition, the caching of locally applicable Internet content may be maintained on a layered basis, such that a first layer of local applicability corresponds to Internet content requested by users in a first geographical area in which the particular location resides, and at least one succeeding layer of local applicability corresponds to Internet content requested by users in at least one succeeding geographical area that encompasses and is larger than the first geographical area.

Merchants or other commercial entities may also provide some form of access to information related to the locally applicable Internet content, with commercial incentives such as coupons or advertisements being delivered to users based upon that information.

The logical proximity based on physical proximity or provision of dedicated bandwidth and resources also applied to the locations of MC Systems and/or Content Servers. MC Systems and/or Content Servers are located according to the local service requirements, dedicated bandwidth and other resources, geographical and demographical situations, cost, etc. The MC Systems can also be structured and placed in layers as described in the layered structure of Content Servers. The comparative positioning of MC Systems and Content Servers are determined based on service requirements, resources, costs, and monetary incentives. Importantly, the Management Centers and Internet Content Servers are structured for efficient transmission of data and to avoid bottleneck problems.

It is noted that this aspect is not limited to Internet content. The MC Systems and Content Servers may store content from various resources.

A variety of data transmission protocols may be used to transmit multimedia content to the MC System, including from cellular networks (e.g., 3G), Internet, Service Providers, and from other MC Systems.

A set of transmitter(s) and/or receiver(s) for connection with external resources is equipped at the MC System. The connection channels for data transmission may include wired line connections (e.g., DSL, Fiber, Cable, DSL, least line,

US 8,135,398 B2

25

etc.) between the MC System and outside networks (e.g., Cellular Network, Internet, Service Provider networks). Additionally, wireless connections (e.g., WiMax, Satellite communications (e.g., VSAT system), traditional communications with cellular base stations, point-to-point or point-to-multipoint wireless connections) may provide the connection between the MC System and outside networks. MC Systems may also connect, communicate, route, and relay content among and between each other. The connections among MC Systems are structured by efficient data transmission, service requirement, cost, bandwidth and other resources availability, and the relationships with Internet Content Servers, Cellular Networks, local Service Providers, and other MC Systems.

A variety of communications may also be applied for the communication channels between the MC System and the various local user terminals. At the user terminal side, the users use TV, computer, DSL modem, Cable modem, WLAN access point, mobile terminals, and various sensors that communicate with the MC System.

A set of transmitter(s) and/or receiver(s) are equipped for the data transmission between the MC System and user terminals. Communication channels between the MC System and user terminals include the following: (1) direct connection using the available transmission port/standard such as USB, RS232, TV cable, Ethernet, Telephone line, etc.; (2) Wireless Personal Area Network such as UWB, Bluetooth, WLAN, etc.; (3) Long-range wireless connections such as WiMax, Satellite, e.g., VSAT, TV broadcast, etc.; or (4) Wireline connection such as DSL, Cable, Ethernet, etc.

The data transmission between an MC System and user terminals can be one-way or two-way. One-way data transmission includes data sent from the MC System to the user terminals and the data sent to the MC System from user terminals. For example, the MC System sends data to user terminals (e.g., advertisement broadcast to TVs, computers, mobile terminals, etc.). Similarly, the user terminals send data to the MC System (e.g., signals sent from a fire alarm to an MC System.). The data transmitted between an MC System and a user terminal is preferably bidirectional. In this circumstance, transmitter and receiver at both sides are equipped.

The operations on data processing and transmission at an MC System can be shared with a plurality of user terminals and/or other MC Systems. In some circumstances, some functions of the MC System described above can be done by a user terminal so the MC System is omitted. One aspect of the invention is a TV or other display that is equipped to receive RF signals sent from cellular base stations. The cellular television demodulates, and/or compresses/decompresses data, and/or converts the signals to the appropriate format before displaying the image/video. The conversion and transmission provided with the television can also be two-way. The cellular television with a video camera/microphone can also record and extract the multimedia information, which can be transmitted to other users' terminals through cellular network or Internet. The cellular television is equipped to extract and/or convert, and/or compress, and modulate the multimedia information before sending it to the cellular base station. The cellular television also preferably has a separate channel for displaying multimedia information from the cellular network or other networks beyond traditional TV programs. Users may also use the TV remote controller to dial telephone numbers like a telephone dial panel.

FIG. 17 is a flow diagram illustrating a process 1700 for directing a television to display content using signals received from a remote location through a cellular communications network. In one embodiment, the process is carried out within a television set that is equipped to receive the signals wire-

26

lessly from a cellular base station and provide the corresponding conversion and direction to display the content on a given channel. In that regard, the housing of the television set includes conventional cellular phone technology for at least receiving (and possibly sending, if desired) calls via a connection to a cellular network. The television set is also equipped with processing capability for carrying out the signal conversion requirements, as described in detail above regarding the MTSCM.

In an alternative embodiment, a set top box is configured to receive the wireless signal, and to output signals appropriately formatted for the television. In still another embodiment, the MC System is equipped to receive a wireless signal, and to perform the conversion and routing to the television set. In either of these circumstances, the set top box or MC System is similarly equipped to provide the noted cellular communications capability and MTSCM functionality. It is also noted that there may be embodiments where the functionality is divided between the set top box, television set, MC System and/or CHS in various ways involving at least two and sometimes all three devices.

The process initiates upon receipt 1702 of video content through a cellular communications channel. This communication may be received, for example, at the initiation of a cellular phone user who wishes to send the content. The connection may, for example, be made using a regular cellular telephone call to a designated number corresponding to the television. At this time, the content as sent from the remote cellular phone to the television will be formatted as required by the cellular network. The MTSCM functionality converts such signals from the cellular network and related format to the format used by the television (e.g., SD or HD standards).

Where it is recognized 1704 that video content has the television as a display destination, the video content is then configured 1706 for display according to the requirements of the television, for example as described regarding the MTSCM functionality. Recognition 1704 that the content is destined for the television set may be presumed where a dedicated number or known routing of signals to the television set at a given interface is provided.

Finally, the television is directed 1708 to display the converted content on a predetermined channel. This predetermined channel may, for example, be a tunable channel that is otherwise unused for other forms of content. To view video content in this fashion, the user merely uses a channel button or the like to navigate to the appropriate channel, and then the converted content is shown on the display screen of the television. In the alternative where the set top box is used to provide the noted functionality, the tuning may be provided through a remote that controls the set top box. A given channel on the set top box may correspond to the content received in this fashion. The output of the set top box provides the converted content through a conventional connection to the television such as an HDMI, component cable, S-video or other connection.

Turning now to several other aspects of the present invention, FIGS. 18-20 illustrate examples wherein the MC System converts and routes content to particular devices.

According to a first aspect, the MC System is configured to convert and route multimedia content to a variety of different (e.g., household) devices, which require addressing and may include not only different communications protocols, but also different formats. FIG. 18 is a flow diagram illustrating a process 1800 of conversion and routing multimedia content to different terminals.

The process 1800 initiates upon receipt 1802 of multimedia content from a source outside the home location, to be

US 8,135,398 B2

27

directed to a destination device within the home location. The destination device may comprise different devices having different formats and receiving signals through different communications protocols.

The MC System then determines 1804 the communications protocol, signal format and address for the destination device. This, for example, may be performed either by referring to the data package information, mapping table information, or a combination thereof as described above.

The inbound multimedia content is then converted 1706 for reproduction by the destination device according to the determined signal format for that device. Finally, the converted multimedia content is routed 1708 to the destination device using the determined address and communications protocol corresponding to the destination device.

According to another aspect, the MC System offers bidirectional conversion, wherein content not only may be inbound to various different devices, but may also be communicated to various remote devices. This function may similarly be carried out using the various connections available with the MC System as well as the corresponding information in the mapping table and data packages.

FIG. 19 is a flow diagram illustrating an example of bidirectional operation involving a first device transmitting inbound content to a second device within the home governed by the MC System, and a third device transmitting outbound content to a fourth device outside the home.

The process 1900 entails receiving 1902 a first multimedia content item originated from a first device located outside the home location and destined for a second device within the home location. The first multimedia content item is then converted 1904 for reproduction and routed to the second device. Similarly, the second multimedia content item is received 1906 from the third device located within the home location and destined for a fourth device located outside the home. The second multimedia content item is converted 1908 for reproduction by the fourth device and the converted multimedia content item is routed to the fourth device.

According to still another aspect of the present invention, the MC System allows a user to remotely make orders for content using a cellular phone, wherein the content may come from a variety of different sources. FIG. 20 illustrates a process 2000 for receiving and accommodating completion of multimedia content requests corresponding to different sources.

The process 2000 initiates by receiving 2002 from the cellular phone user requests access to first and second multimedia content items. Examples of requests may include individual content purchases, selection of content previously purchased, selection of content that does not need to be purchased, and others. For example, the cellular phone may be used to directly contact the MC System. Another way this may be done is by using a cellular phone to communicate with the MC System with intervening communication occurring with the cellular base station. That is, with reference to FIG. 16, the cellular phone may be used to communicate with the cellular base station, and the cellular base station may then communicate with the MC System using the various communication channel options as shown. The first and second multimedia content items may of course be ordered on separate occasions and may correspond to content available from completely different sources.

The MC System identifies 2004 a first source corresponding to a first multimedia content item as well as a second source corresponding to a second multimedia content item.

28

These sources may use any number of different communications protocols to carry out the delivery of content to the home.

The MC System then separately initiates 2006 communications with the first and second sources using the different communications protocols to fulfill the requests to order access to the first and second multimedia content items. The first and second multimedia content items are then received 2008 by the MC System and converted for reproduction by the destination device and routed accordingly (2010).

Various devices and various content sources may be applicable according to this embodiment. For example, an initial step may involve the user communicating with the MC/CHS using his cellular phone (e.g., directly, or through an intervening cellular base station). The user may then make various types of requests to the MC/CHS. For example, the MC/CHS may be instructed to make a call to another user's cellular phone. Alternatively, the user may instruct the MC/CHS to obtain information corresponding to a request, such as current news stories based upon a previously or currently submitted keyword (e.g., news regarding President's veto of a law). Corresponding format and addressing information is then provided to the MC/CHS. For example, the MC/CHS may be instructed that the IP address of the user's PC is the destination address for the requested cellular phone call, and the cable port address of the user's television may be the destination address for the requested news. Finally, the MC/CHS engages in appropriate conversion and routing to deliver the requested content accordingly. For example, the MC may communicate with the cellular network to find the other user to whom the cellular phone call is desired, and convert the received data package defined as the cellular network to a TCP package, providing the user's PC IP address as the destination address. Network protocols may then be used to transmit the converted data to the user's PC (e.g., over the Internet (TCP/IP) or through a direct network connection). With regard to the provision of the news corresponding to the search query, the MC/CHS may use the MC content layer structure to find the best source and route for the requested content. For example, it may seek the news at a local Internet content server (which may be the MC System itself, as the MC System is configured to store content that may be variously served as described herein). The MC System converts the corresponding content to a television format and transmits it to the television such as through a direct wired connection or a wireless connection (e.g., via UWB between the TV and CHS).

According to still another aspect of the present invention, a method for optimizing the delivery of content that is commonly requested by a plurality of users in a particular location is provided. This entails monitoring network content requested by users corresponding to the particular location, receiving a request for a particular content item from a given user in the particular location, wherein the particular content item is ordinarily served from a location outside the particular location, determining that the particular content item is also requested by other users in the particular location, and concurrently serving the particular content item to the given user and the other users using a server that is logically proximate to users in the particular location, in lieu of separately serving the particular content item to the given user and the other users from locations outside the particular location. In one embodiment, the layered approach previously described is used to make determinations as to whether content is locally applicable. At that location, requested content may be monitored and determinations as to whether the content is commonly requested within the particular locality may be made.

US 8,135,398 B2

29

Thus embodiments of the present invention produce and provide multimedia communications between different terminals. Although the present invention has been described in considerable detail with reference to certain embodiments thereof, the invention may be variously embodied without departing from the spirit or scope of the invention. Therefore, the following claims should not be limited to the description of the embodiments contained herein in any way.

The invention claimed is:

1. A method for conversion and sending of content to devices, the method comprising:

receiving a multimedia content item originated from a source located outside a home location and destined for a destination device located within the home location, wherein the multimedia content item is received through a wireless communication network and from a wireless terminal device;

converting the multimedia content item for reproduction according to a determined signal format of the destination device; and

sending the converted multimedia content item to the destination device, wherein the destination device is a television, and wherein the sending comprises:

establishing a predetermined channel operatively in communication with the destination device and transporting the multimedia content item to the destination device via said predetermined channel, for the destination device to display the multimedia content item in conjunction with a navigational command to the destination device for the predetermined channel.

2. The method of claim 1, further comprising: determining a predetermined processing category for the multimedia content item, wherein converting the multimedia content item is performed according to the predetermined processing category.

3. The method of claim 2, wherein the predetermined processing category identifies a communication protocol, a signal format, and an address for the destination device, wherein the converting of the multimedia content item is performed according to the signal format, and wherein the sending of the converted multimedia content item uses the address and the communication protocol.

4. The method of claim 2, wherein the predetermined processing category prompts addressing, conversion and routing to the television through a network connection.

5. The method of claim 2, wherein the predetermined processing category prompts routing to the television through an HDMI input of the television.

6. The method of claim 1, further comprising: receiving other multimedia content item sourced from a media capture device of the television; and transmitting the other multimedia content item to an other destination device.

7. The method of claim 6, wherein transmitting the other multimedia content item to the other destination device is through a cellular communication network.

8. The method of claim 1, wherein the wireless communication network is a cellular communication network.

9. The method of claim 1, further comprising: storing the converted multimedia content item in a non-volatile computer storage medium; and routing the stored, converted multimedia content item to an input of the television.

10. An apparatus for conversion and sending of content to devices that employ differing communication protocols, the apparatus comprising:

means for receiving a multimedia content item originated from a source located outside a designated location and destined for a destination device located within the designated location, wherein the multimedia content item is

30

received through a wireless communication network and from a wireless terminal device;

means for converting the multimedia content item for reproduction according to a determined signal format of the destination device; and

means for sending the converted multimedia content item to the destination device, wherein the destination device is a television, and wherein the sending comprises:

establishing a predetermined channel operatively in communication with the destination device

and transporting the multimedia content item to the destination device via said predetermined channel,

for the destination device to display the multimedia content item in conjunction with a navigational command to the destination device for the predetermined channel.

11. A method performed by a centralized HUB system located within a designated location, for converting and routing of content to devices that employ differing communication protocols, the method comprising:

receiving, by the centralized HUB system, a first multimedia content item originated from a first source located outside the designated location and destined for a destination device, the first multimedia content item being received following a communication from the centralized HUB system to the first source in response to a request received by the centralized HUB system from a wireless device separate from the destination device;

converting, by the centralized HUB system, the first multimedia content item for reproduction according to a signal format for the destination device;

routing, by the centralized HUB system, the converted multimedia content item to the destination device using an address and a communications protocol for the destination device;

receiving, by the centralized HUB system, a second multimedia content item originated from a second source through a wireless communication network; and

sending the second multimedia content item to the destination device;

wherein the sending comprises:

establishing a predetermined channel operatively in communication with the destination device,

and transporting the multimedia content item to the destination device via said predetermined channel,

for the destination device to display the multimedia content item in conjunction with a navigational command to the destination device for the predetermined channel.

12. A non-transitory computer readable medium storing program code for converting and routing of content to devices that employ differing communication protocols, by a centralized HUB system located within a designated location, the program code including instructions executable by a processor to perform operations comprising:

receiving, by the centralized HUB system, a first multimedia content item originated from a first source located outside the designated location and destined for a destination device, the first multimedia content item being received following a communication from the centralized HUB system to the first source in response to a request received by the centralized HUB system from a wireless device separate from the destination device;

converting, by the centralized HUB system, the first multimedia content item for reproduction according to a signal format for the destination device;

US 8,135,398 B2

31

routing, by the centralized HUB system, the converted multimedia content item to the destination device using an address and a communications protocol for the destination device;

receiving, by the centralized HUB system, a second multimedia content item originated from a second source through a wireless communication network; and sending the second multimedia content item to the destination device;

wherein the sending comprises:

establishing a predetermined channel operatively in communication with the destination device, and transporting the multimedia content item to the destination device via said predetermined channel, for the destination device to display the multimedia content item in conjunction with a navigational command to the destination device for the predetermined channel.

13. A centralized HUB system for converting and routing of content to devices that employ differing communication protocols, the centralized HUB system configured for location within a designated location, the system comprising:

a processor; and
a memory, the memory storing program code executable by the processor to perform operations comprising:

receiving, by the centralized HUB system, a first multimedia content item originated from a first source located outside the designated location and destined for a destination device, the first multimedia content item being received following a communication from the centralized HUB system to the first source in response to a request received by the centralized HUB system from a wireless device separate from the destination device;

converting, by the centralized HUB system, the first multimedia content item for reproduction according to a signal format for the destination device;

routing, by the centralized HUB system, the converted multimedia content item to the destination device using an address and a communications protocol for the destination device;

receiving, by the centralized HUB system, a second multimedia content item originated from a second source through a wireless communication network; and sending the second multimedia content item to the destination device;

wherein the sending comprises:

establishing a predetermined channel operatively in communication with the destination device, and transporting the multimedia content item to the destination device via said predetermined channel, for the destination device to display the multimedia content item in conjunction with a navigational command to the destination device for the predetermined channel.

14. A non-transitory computer readable medium storing program code for converting and sending of content to devices, program code being executable by a processor to perform operations comprising:

receiving a multimedia content item originated from a source located outside a designated location and destined for a destination device located within the designated location, wherein the multimedia content item is received through a wireless communication network and from a wireless terminal device;

converting the multimedia content item for reproduction according to a determined signal format of the destination device; and

32

sending the converted multimedia content item to the destination device, wherein the destination device is a television, and wherein the sending comprises:

establishing a predetermined channel operatively in communication with the destination device, and transporting the multimedia content item to the destination device via said predetermined channel, for the destination device to display the multimedia content item in conjunction with a navigational, command to the destination device for the predetermined channel.

15. A wireless terminal apparatus for converting and sending of content to devices, the apparatus comprising:

a processor; and
a memory, the memory storing program code executable

by a processor to perform operations comprising:
receiving a multimedia content item originated from a source located outside a designated location and destined for a destination device located within the designated location, wherein the multimedia content item is received through a wireless communication network by the wireless terminal apparatus;

converting the multimedia content item for reproduction according to a determined signal format of the destination device; and

sending the converted multimedia content item to the destination device, wherein the destination device is a television, and wherein the sending comprises:

establishing a predetermined channel operatively in communication with the destination device, and transporting the multimedia content item to the destination device via said predetermined channel, for the destination device to display the multimedia content item in conjunction with a navigational command to the destination device for the predetermined channel.

16. The method of claim 1, wherein the wireless terminal device is a cellular phone.

17. The method of claim 16, wherein said receiving the multimedia content item, said converting the multimedia content item and said sending the converted multimedia content item are performed by an intermediary device between the cellular phone and the destination device.

18. The method of claim 1, wherein said receiving the multimedia content item, said converting the multimedia content item and said sending the converted multimedia content item are performed by a mobile device that further comprises the wireless terminal device.

19. The method of claim 18, wherein the mobile device is a cellular phone.

20. The method of claim 1, wherein the determined signal format is a high definition format of the destination device.

21. The method of claim 20, wherein the resolution of the high definition format is 720 p or greater.

22. The method of claim 20, wherein said converting the multimedia content item comprises increasing resolution of the multimedia content item to the high definition format.

23. The method of claim 1, wherein said establishing the predetermined channel comprises managing a communication path for said transporting the multimedia content item to the destination device, wherein said managing includes initiating the communication path, and said initiating the communication path includes engaging in an authentication procedure with the destination device prior to said transporting the multimedia content item to the destination device over the communication path.

24. The method of claim 23, wherein the communication path implements an HDMI connection to the destination device.

US 8,135,398 B2

33

25. The method of claim 18, wherein said establishing the predetermined channel comprises initiating a communication path for said transporting the multimedia content item to the destination device, wherein said initiating the communication path includes engaging in an authentication procedure with the destination device prior to said transporting the multimedia content item to the destination device over the communication path.

26. The method of claim 25, wherein the communication path implements an HDMI connection to the destination device.

27. The method of claim 2, wherein said establishing the predetermined channel comprises initiating a communication path that is configured according to the predetermined processing category.

28. The method of claim 1, wherein the wireless terminal device resides in a mobile device.

29. The method of claim 1, wherein the wireless terminal device resides in the destination device.

30. The method of claim 29, wherein said receiving the multimedia content item, said converting the multimedia content item and said sending the converted multimedia content item are performed by one or more devices within the destination device.

31. The method of claim 1, wherein the multimedia content item is received from a cell phone and the multimedia content item is high-resolution graphics appropriate for display on the cell phone.

32. The method of claim 1, further comprising:
storing and routing the multimedia content item.

33. The method of claim 1, wherein the wireless communication network is a WIFI network.

34. The method of claim 28, wherein said receiving the multimedia content item, said converting the multimedia content item and said sending the converted multimedia content item are performed by the mobile device and an intermediary device between the mobile device and the destination device.

35. The method of claim 20, wherein said converting the multimedia content item comprises encoding the multimedia content item to HDMI format.

36. The method of claim 1, wherein the multimedia content item is high-resolution graphics appropriate for display on a cell phone screen.

37. The computer readable medium of claim 14, wherein the operations further comprise:

determining a predetermined processing category for the multimedia content item, wherein converting the multimedia content item is performed according to the predetermined processing category.

38. The computer readable medium of claim 37, wherein the predetermined processing category identifies a communication protocol, a signal format, and an address for the destination device, wherein the converting of the multimedia content item is performed according to the signal format, and wherein the sending of the converted multimedia content item uses the address and the communication protocol.

39. The computer readable medium of claim 37, wherein the predetermined processing category prompts addressing, conversion and routing to the television through a network connection.

40. The computer readable medium of claim 37, wherein the predetermined processing category prompts routing to the television through an HDMI input of the television.

41. The computer readable medium of claim 14, wherein the wireless communication network is a cellular communication network.

34

42. The computer readable medium of claim 14, wherein the wireless terminal device is a cellular phone.

43. The computer readable medium of claim 42, wherein said receiving the multimedia content item, said converting the multimedia content item and said sending the converted multimedia content item are performed by an intermediary device between the cellular phone and the destination device.

44. The computer readable medium of claim 14, wherein said receiving the multimedia content item, said converting the multimedia content item and said sending the converted multimedia content item are performed by a mobile device that further comprises the wireless terminal device.

45. The computer readable medium of claim 44, wherein the mobile device is a cellular phone.

46. The computer readable medium of claim 14, wherein the determined signal format is a high definition format of the destination device.

47. The computer readable medium of claim 14, wherein said establishing the predetermined channel comprises managing a communication path for said transporting the multimedia content item to the destination device, wherein said managing includes initiating the communication path, and said initiating the communication path includes engaging in an authentication procedure with the destination device prior to said transporting the multimedia content item to the destination device over the communication path.

48. The computer readable medium of claim 47, wherein the communication path implements an HDMI connection to the destination device.

49. The computer readable medium of claim 44, wherein said establishing the predetermined channel comprises initiating a communication path for said transporting the multimedia content item to the destination device, wherein said initiating the communication path includes engaging in an authentication procedure with the destination device prior to said transporting the multimedia content item to the destination device over the communication path.

50. The computer readable medium of claim 49, wherein the communication path implements an HDMI connection to the destination device.

51. The computer readable medium of claim 37, wherein said establishing the predetermined channel comprises initiating a communication path that is configured according to the predetermined processing category.

52. The computer readable medium of claim 14, wherein the wireless terminal device resides in a mobile device.

53. The computer readable medium of claim 14, wherein the multimedia content item is received from a cell phone and the multimedia content item is high-resolution graphics appropriate for display on the cell phone.

54. The computer readable medium of claim 52, wherein said receiving the multimedia content item, said converting the multimedia content item and said sending the converted multimedia content item are performed by the mobile device and an intermediary device between the mobile device and the destination device.

55. The wireless terminal apparatus of claim 15, wherein the operations further comprise:

determining a predetermined processing category for the multimedia content item, wherein converting the multimedia content item is performed according to the predetermined processing category.

56. The wireless terminal apparatus of claim 55, wherein the predetermined processing category identifies a communication protocol, a signal format, and an address for the destination device, wherein the converting of the multimedia content item is performed according to the signal format, and

US 8,135,398 B2

35

wherein the sending of the converted multimedia content item uses the address and the communication protocol.

57. The wireless terminal apparatus of claim 55, wherein the predetermined processing category prompts addressing, conversion and routing to the television through a network connection.

58. The wireless terminal apparatus of claim 55, wherein the predetermined processing category prompts routing to the television through an HDMI input of the television.

59. The wireless terminal apparatus of claim 15, wherein the wireless communication network is a cellular communication network.

60. The wireless terminal apparatus of claim 15, wherein the wireless terminal apparatus is a cellular phone.

61. The wireless terminal apparatus of claim 15, wherein the determined signal format is a high definition format of the destination device.

62. The wireless terminal apparatus of claim 15, wherein said establishing the predetermined channel comprises managing a communication path for said transporting the multimedia content item to the destination device, wherein said managing includes initiating the communication path, and said initiating the communication path includes engaging in an authentication procedure with the destination device prior to said transporting the multimedia content item to the destination device over the communication path.

63. The wireless terminal apparatus of claim 62, wherein the communication path implements an HDMI connection to the destination device.

64. The wireless terminal apparatus of claim 55, wherein said establishing the predetermined channel comprises initiating a communication path that is configured according to the predetermined processing category.

65. The wireless terminal apparatus of claim 15, wherein the wireless terminal apparatus receives the multimedia content item from a cell phone and the multimedia content item is high-resolution graphics appropriate for display on the cell phone.

66. The method of claim 11, wherein the centralized HUB system routes addresses between EP and cellular telephone number.

67. The method of claim 11, wherein the centralized HUB system receives the request through a wireless channel, wherein the wireless channel includes one or more of Bluetooth, UWB, and/or NFC.

68. The method of claim 11, further comprising:
receiving a third multimedia content item destined for another destination device located outside the designated location;
determining a communications protocol, a signal format and an address for the other destination device;
converting the third multimedia content item for reproduction according to the determined signal format; and
routing the converted multimedia content item to the other destination device using the determined address and communications protocol.

69. The method of claim 11, wherein the first multimedia content item is received in connection with a data package that identifies the destination device.

70. The method of claim 11, wherein a mapping table maps the destination device to an appropriate communications protocol, signal format and address.

71. The method of claim 11, further comprising:
storing the converted multimedia content item in a non-volatile computer storage medium.

72. The method of claim 11, wherein the HUB System is a module resident in the destination device.

36

73. The method of claim 11, wherein the wireless communication network through which the second multimedia content item is received includes a cellular network.

74. The method of claim 11, wherein the first multimedia content item is received through a wireless communication network.

75. The method of claim 11, wherein the wireless device is a mobile terminal.

76. The computer readable medium of claim 12, wherein the centralized HUB system routes addresses between IP and cellular telephone number.

77. The computer readable medium of claim 12, wherein the centralized HUB system receives the request through a wireless channel, wherein the wireless channel includes one or more of Bluetooth, UWB, and/or NFC.

78. The computer readable medium of claim 12, wherein the operations further comprise:

receiving a third multimedia content item destined for another destination device located outside the designated location;
determining a communications protocol, a signal format and an address for the other destination device;
converting the third multimedia content item for reproduction according to the determined signal format; and
routing the converted multimedia content item to the other destination device using the determined address and communications protocol.

79. The computer readable medium of claim 12, wherein the first multimedia content item is received in connection with a data package that identifies the destination device.

80. The computer readable medium of claim 12, wherein a mapping table maps the destination device to an appropriate communications protocol, signal format and address.

81. The computer readable medium of claim 12, wherein the HUB System is a module resident in the destination device.

82. The computer readable medium of claim 12, wherein the wireless communication network through which the second multimedia content item is received includes a cellular network.

83. The computer readable medium of claim 12, wherein the first multimedia content item is received through the wireless communication network.

84. The computer readable medium of claim 12, wherein the wireless device is a mobile terminal.

85. The centralized HUB system of claim 13, wherein the centralized HUB system routes addresses between IP and cellular telephone number.

86. The centralized HUB system of claim 13, wherein the centralized HUB system receives the request through a wireless channel, wherein the wireless channel includes one or more of Bluetooth, UWB, and/or NFC.

87. The centralized HUB system of claim 13, wherein the operations further comprise:

receiving a third multimedia content item destined for another destination device located outside the designated location;
determining a communications protocol, a signal format and an address for the other destination device;
converting the third multimedia content item for reproduction according to the determined signal format; and
routing the converted multimedia content item to the other destination device using the determined address and communications protocol.

88. The centralized HUB system of claim 13, wherein the first multimedia content item is received in connection with a data package that identifies the destination device.

US 8,135,398 B2

37

89. The centralized HUB system of claim 13, wherein a mapping table maps the destination device to an appropriate communications protocol, signal format and address.

90. The centralized HUB system of claim 13, wherein the HUB System is a module resident in the destination device.

91. The centralized HUB system of claim 13, wherein the wireless communication network through which the second multimedia content item is received includes a cellular network.

38

92. The centralized HUB system of claim 13, wherein the first multimedia content item is received through a wireless communication network.

93. The centralized HUB system of claim 13, wherein the wireless device is a mobile terminal.

* * * * *